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ALEXANDER AGASSIZ.

BY MARCUS BENJAMIN.

Men of genius have seldom been fortunate in their offspring. Neither Cæsar nor Shakespeare left children to perpetuate their fame. In the annals of American science there are remarkable exceptions to this rule. John W. Draper was fortunate in having three sons who succeeded to his name, and each of whom distinguished himself in some branch of scientific thought. The elder Silliman gave place to his son of almost equal renown. James D. Dana, referred to in a recent issue of the SCIENTIFIC AMERICAN, has an able successor in his son, Edward S. Dana, who at present is following in the footsteps of his illustrious senior. In Alexander Agassiz we have also a great son descended from a distinguished father—not great by reflected light, but great in comparison, great in his own individuality. It has been well said of him that he is "the best authority in the world on certain forms of marine life."

The little city of Neuchatel, once the stronghold of princes, is picturesquely situated on the side of one of the Jura mountains and along the shores of the lake of the same name, in whose waters lies hidden the history of a prehistoric people, who are known only through the fragmentary remains that occasionally come to us through the lacustrine finds. Peace and quiet are now the characteristics of the Neuchatelois, within whose territory there once occurred some of the greatest battles of Charles the Bold, Duke of Burgundy. There comes but little in these modern days to disturb the watch making of this industrious people. Across the lake, stretched in a long row, are the white-capped Alps, beginning with Mont Blanc on the extreme right, and ending with the famous peaks of the Bernese Oberland on the left. To a chance traveler, seated on the veranda of some country seat on the side of the mountain, sipping his *eau sucrée* or, better still, the famous red wine of the canton, he can see, when the day is clear, across the fertile Pays du Vaud, the great mountains as they glisten in the sunlight, and fancy that he can hear the running water trickling down their sides to reach the mighty Rhone, which flows on its way through France to the Mediterranean, or to swell the current of the rapid Aar, that adds its stream to increase the historic Rhine just before it leaves Switzerland. Perhaps later, if the scene tempts him, he will observe a bright speck of light coming over the mountains, which, from its brilliancy, would lead him to fancy that some forest fire had broken out on the Alps, till soon the lurid, red harvest moon comes up in all its glory.

To this little city, in 1832, came Louis Agassiz, to fill the professorship of natural science in its college. Here, with Guyot, Lesquereux, Desor, and others known in the history of American science, he founded the scientific society of that town, and here, on December 17, 1835, his son Alexander was born. On a narrow street near the Palais Rougement, and not far from the lake, on the Rue des Orangers, there is pointed out the residence of Agassiz, and I wonder was it there that the son was born.

In October, 1833, Louis Agassiz was married to Cecile Braun, the sister of his college friend, Alexander Braun, later the distinguished botanist and philosopher, and of Maximilian Braun, mining engineer and chief director of the largest zinc mine in Europe, La Vieille Montagne.

Arnold Guyot says of her that she "was a noble minded young woman, of rare moral excellence. A dignified serenity, tempered by much gentleness and simplicity of manner, won for her at once respect and affection. Her deeper feelings were often veiled by a natural reserve, which, however, never assumed the appearance of coldness. Her talent for drawing was of the first order, and she was fond of placing it at the disposal of her favorite brother, Alexander. The drawings of natural objects which she executed for him, and later for Agassiz, commanded the admiration of all by their taste and exquisite correctness."

That her son would know how to draw, and would inherit a love of natural history, was probable. We shall see.

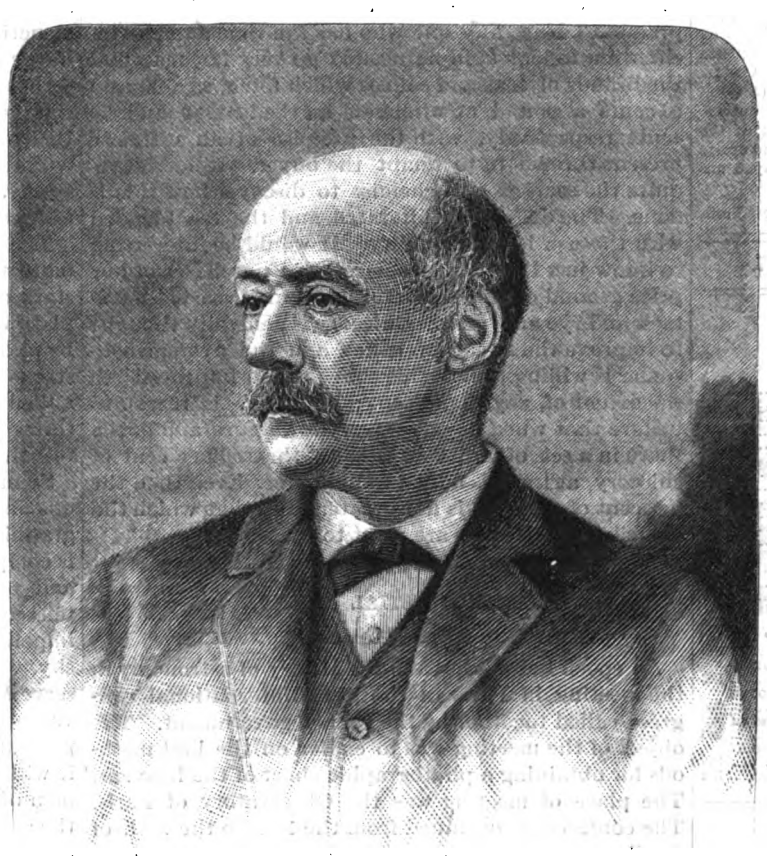
Alexander's early education was received in Europe, and we can imagine him as a boy watching the fishermen with the nets along the shores of the lake, or perhaps catching butterflies in the fields above the town. The huge granite bowlder called Pierre à Bot, that came from the Alps across the great glacier that once filled the valley of Switzerland, may have been the first geological curiosity that attracted his attention; or he may have spent his time in searching for the shell fossils so common in the soft Neocomian rock of that district.

Meanwhile, in 1846, the elder Agassiz had arrived in the United States, but the boy stayed with his mother in Neuchatel, and it was only after her death that he came to this country, at the age of fifteen years. He then prepared for Harvard, and was graduated in 1855, numbering among his classmates Phillips Brooks, the distinguished rector of Trinity Church, Boston. A college sketch of him says:

"His classmates testify that his ability with the brush and pencil was often put to excellent uses during his college life;" and "he also inherited his father's wonderful persistence in accurate study and research."

On leaving college, he determined to study for a profession, and choosing that of civil engineering, he entered the Lawrence Scientific School of Harvard, where he was graduated in 1857, with the degree of B.S. He then spent three terms in the chemical department, and during the same time was engaged as one of the teachers in Prof. Agassiz's school for young ladies.

In March, 1859, he went to California, where he was appointed an assistant on the United States Coast Survey, being assigned to work on the northwestern boundary. After the beginning of the rainy season, he returned to San Francisco, and on the completion of the office work, resigned from the survey. His skill with the pencil was brought into service at this time by drawing specimens of the fish caught along the boundary. He also began to collect specimens for his father, and showed himself an adept in their study and preservation. The greater part of the winter of 1859–60 was spent at Panama and Acapulco, collecting specimens for the Museum of Comparative Zoology at Cambridge. In the spring he again returned to San Francisco, where he was still occupied in obtaining specimens and in studying fishes, of which he made remarkably fine drawings. Later, he visited the interior of the State and examined the principal mines.



A. Agassiz

THE NATIONAL ACADEMY OF SCIENCES.

In July, 1860, he returned to Cambridge, and was made agent of the museum. After a full course of study in the zoological and geological departments of the Lawrence Scientific School, he was appointed assistant in zoology, and during the absence of his father in Brazil, in 1865, had entire charge of the museum. Subsequently, during the same year, he became engaged in coal mining in Pennsylvania, in addition to his appointment in Cambridge.

In 1866 he went to Lake Superior, and became connected with the Calumet mine, as treasurer. Soon after he was engaged in the development of the adjoining Hecla mine, becoming, in 1867, superintendent of the combined properties. For two and a half years he worked on an average of fourteen and a half hours a day, and in 1869 returned to Boston as the president of the Calumet and Hecla Mining Company, at present the owners of the largest and richest copper deposits in the world. In the development of this great mining property, Mr. Agassiz showed unusual ability as a mining engineer, solving difficulties in this field without precedent.

The mines have become exceedingly valuable, and great wealth has been the reward of his activity. Edwin H. Abbot, one of his classmates, writes in this connection that "the development of the Calumet and Hecla mines, which supply annually one-tenth of all the copper used in the civilized world, and control the American market, is more the result of his scientific and executive ability than of any other one thing. Its plant of machinery alone has cost over $3,000,000. It has been devised and created under his direct supervision, and has rendered these mines second to none in the world. For most men this mining achievement would alone be a life work, and glory enough to make its author famous. To Agassiz, however, it is merely an incident in a scientific life which has already placed him in the front rank of natural scientists."

In the autumn of 1869 he went abroad and examined the museums and collections of England, France, Germany, Italy, and Northern Europe. A year later he returned to Cambridge, and became assistant curator of the museum, which office he retained until the death of Professor Agassiz, in 1874, when he was selected to succeed him as curator. A contemporary scientific journal comments on this event as follows: "It is rare that the mantle of the father sits worthily on the son. Especially is this true when the father has been signally eminent in pure science. Happily indeed is it for America, and for biological science, that the vast plans of the late Agassiz are to be continued, as far as possible, on the grand scale upon which his great mind projected them."* He has since retained the executive office of the museum, and during 1887 was engaged in making extensive repairs and alterations in the building. Mr. Agassiz has been a most liberal benefactor to the museum. President Charles W. Eliot said,† in 1880, that since 1871 he had given no less than $230,000 to a single department of the university. He has a peculiar way of giving. If he sees a need in one of the departments of the university, he goes and supplies it, pays the bill, and says nothing more about the transaction. He thinks this department needs more room. At once he contracts for a building, and erects it on the land of the president and fellows, without even communicating the fact that he proposes to erect such a building. His donations in all to Harvard University have amounted to upward of $500,000. He was elected by the alumni one of the overseers of Harvard in 1874, and chosen by the corporation to be one of its fellows in 1878, but in 1885 failing health compelled his resignation.

In 1873, he became connected with the direction of the Anderson School of Natural History, on Penikese Island, and subsequent to his father's death conducted that enterprise, but differences between himself and Mr. Anderson led to the closing of the school.

(*Continued on page* 389.)

* *Popular Science Monthly*, March, 1874.

† Harvard Club dinner, New York, February 20, 1880.

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(Illustrated articles are marked with an asterisk.)

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SCIENTIFIC AMERICAN SUPPLEMENT

No. 598

For the Week Ending June 18, 1887.

Price 10 cents. For sale by all newsdealers.

COFFEE AND TEA ADULTERATION.

An enterprising daily paper, anxious to learn something of the extent and nature of that general adulteration of tea and coffee which has so often been alleged, recently caused several hundred samples of these to be gathered from various retail stores throughout the city of New York, and turned the same over to a chemist for analysis. The results as published would indicate that sophistication of these products is so rare as to scarcely deserve mention, and might, as a natural consequence, be looked to to prove that the charges so frequently made may not be sustained.

This particular examination is valuable in its way, but it does not go far enough. It has not by any means proved that tea and coffee do not suffer very generally hereabout from adulteration. It only proves that pure coffee and tea may readily be had, if only one asks for and shows a disposition to pay for them, and perhaps it is not too much to add that all this was generally known before.

Those who collected the samples for the recent test were instructed to ask for *pure* coffee and *pure* tea, and were supplied with money to pay for these articles. But let us suppose that they contented themselves with purchasing samples of these articles which were placarded before their eyes, "Pure Java Coffee" and "Pure Tea," at ridiculously low prices. How would these have stood the test?

It is a custom, now become quite general in New York and elsewhere, to give away china and other wares to the purchaser of a certain specified number of pounds of tea or coffee, some stores giving tickets with each pound sold, which tickets, when enough are in hand, entitle the owner to various descriptions of presents. Now, any one who has the time and the inclination to look (and he needn't go very far) may find the brands of teas and coffees which fetch, say, 40 and 80 cents a pound at wholesale marked at 30 and 70 cents respectively, with the promise of an ultimate present thrown in to tempt the buyer. It doesn't require the services of a chemist to discover how this is done. The coffee is adulterated, and the tea blended with those of inferior quality. It would be interesting to know just how much chiccory the purchaser of low price ground coffees gets, and how much roasted hardtack and rye and peas. Chiccory is generally thought to improve the flavor of coffee, and the average consumer is willing to have his coffee thus "improved" to the extent of, say, 5 per cent; but there is reason to believe that when he pays a very low figure, and gets a share in a set of crockery besides, that 40 per cent of chiccory, at least, is added to his coffee. Even then the per cent of chiccory is not greater than that which the French and Germans are wont to use.

THE CELESTIAL WORLD.

THE PARIS ASTRONOMICAL CONGRESS.

An epoch has occurred in the history of astronomy in the meeting in Paris of the great international congress, called together by the French government. The object of the meeting was to confer on the best methods for obtaining a photographic chart of the heavens. The place of meeting was the Observatory of Paris. The conference continued from the 14th to the 25th of April.

Astronomers of note from all parts of the civilized world were present on the occasion. Among the foreign astronomers were: Struve, of Pulkowa; Christie, of Greenwich; Tacchini, of Rome; Gill, of Cape Town; Weiss, of Vienna; Beuf, of La Plata; Cruls, of Rio de Janeiro; Peters, of Clinton; and many others of equal distinction. The French astronomers were, of course, present to take part in the proceedings.

The French government, the Academy of Sciences, and M. Mouchez, the director of the Paris Observatory, made every possible effort to promote the object of the meeting, and provide for the entertainment of the guests comprising the various nationalities.

M. Flourens, the Minister of Foreign Affairs, made the opening address, welcoming the delegates and summing up the object of the meeting.

M. Mouchez took the initiative, as was his due, for it was mainly through his exertions that the conference was inaugurated. Entire unanimity prevailed during the sessions, which were exclusively devoted to the special purpose for which the congress assembled. The unparalleled success attending the experiments in celestial photography made by the Messrs. Henry, of the Paris Observatory, was the inspiration of the movement, and led to the assembling of the congress. Its main object was to discover the most desirable plan for photographing the entire heavens, and thus form a complete chart of the starlit sky as now seen by the inhabitants of the earth. The principal topics discussed were concerning the best kind of apparatus to be used, the most desirable dimensions for the telescopes, the number of magnitudes of stars to be included in the photographic maps, and the number of observatories to take part in the work.

The principal results are embodied in the following resolutions:

1. That the success already attained by astronomical photography makes it imperative that a chart of the entire heavens shall be prepared by the combined efforts of a number of observatories.

2. That refracting telescopes shall be used for the purpose, having an objective of 13·38 inches and a focal distance of 11·25 feet, like those constructed by the Messrs. Henry and now in use at the observatory in Paris.

3. Stars of the 14th magnitude will constitute the extreme limit of those to be photographed. There will be two series of photographic plates, the one comprising all the stars down to the 14th magnitude, the other including only those as far down as the 11th magnitude. The different magnitudes will be determined by the scale used in France.

4. A uniform formula will be adopted for the preparation of the plates to obtain an equal sensitiveness for all that are used. The measures of the photographic images will be made with an apparatus capable of giving at the same time the co-ordinates in right ascension and declination. Great distances will be measured on a determined scale, and smaller distances, down to 0·039 of an inch, will be calculated by the micrometer of the microscope.

The work of photographing the heavens will be divided among a great number of observatories. It is expected that portions of the work will be undertaken by at least twelve American, nearly as many French, two or three British, and as many Germany observatories, while Russia, Italy, and Austria will not be behind their compeers. The arrangements are by no means perfected. At the close of the congress only two directors of observatories—Cruls, of Rio de Janeiro, and Beuf, of La Plata—had received the necessary instructions from their respective governments to engage in the work. The directors of four other observatories—those of Paris, Algiers, Bordeaux, and Toulouse—had signified their readiness to take part of the burden on their shoulders. The other directors were ready and willing, but are waiting for the permission of their respective governments and the appropriation of the necessary funds.

The stars of the first fourteen magnitudes number more than 40,000,000. The time required to impress stars of different magnitudes upon the photographic plate varies greatly. A star of the first magnitude can be photographed in one two-hundredth of a second. A star of the sixth magnitude, the smallest visible to the naked eye, requires half a second, while an exposure of thirteen minutes is necessary for a star of the fourteenth magnitude.

Some faint idea may thus be formed of the marvelous undertaking which will soon take form in a photographic chart of the entire heavens. When the work is completed, every star now visible to the human eye, and nearly every star revealed in the most powerful telescopes now existing, will hold its fitting place on the imperishable record, which will be a facsimile of the sky, with its 40,000,000 stars as they appear to the observers of the present time. How inestimable is the value of the gift thus made by the astronomy of the present to the astronomy of the future! How carefully it will be scanned, how dearly it will be prized, by the men of science who follow in our steps as the basis for the solution of the general constitution of the sidereal universe, the key that reveals the secret of the changes that take place among the star depths!

A New Apple Pest.

THE APPLE LEAF FLEA BEETLE (*Haltica punctipennis*, LE CONTE).

As long ago as 1872 I found the larvæ of a little flea beetle known as *Haltica punctipennis* in Missouri, feeding upon hawthorn. In 1877 I found it again in Colorado, but the species has never been considered injurious until the present year. This spring, however, it has appeared in great numbers in the vicinity of Dallas, Tex., and of Gainesville, Tex. Mr. J. R. Johnson, of Dallas, writes that they appeared in great numbers about the first week in May, and that within two or three days thereafter they had destroyed his entire lot of apple and pear grafts. They then removed to his one and two year old apple trees. Mr. Johnson had never been troubled with them before, although he remembers to have seen them in limited numbers in 1883 upon his young apples.

The habits and general appearance of this new apple pest are quite similar to those of the grapevine flea beetle (*H. chalybea*). The larva is rather slender, dark yellow-brown in color, with darker head, and prothoracic shield, and each segment bears four transverse dorsal warts. The legs are black, and project out at the sides of the thorax.

The adult beetle is shining green rather that steel-blue, and is distinguished from the grapevine flea beetle by its smaller size and by the numerous minute impressed dots on its thorax and wing covers.

This insect, although exciting considerable alarm, will easily be subdued by arsenical poisons, the use of which is well understood in Texas. Mr. Johnson has already applied Paris green in its dry form with good results.—*Prof. C. V. Riley.*

PHOTOGRAPHIC NOTES.

Stripping Bromide Prints.—Hand polished rubber, on which bromide prints are squeegeed for the purpose of imparting a high gloss when dry, we have found to become dulled on the surface by continued use, which prevents the stripping or pulling of the prints as readily and quickly as formerly. The washing water was at a temperature of 64°, yet notwithstanding this advantage, there appeared to be something in the softness of the gelatine surface on the paper or in the rubber plate, or the moist condition of the atmosphere, which made the paper adhere too firmly.

The difficulty was quickly overcome by adding to the hypo bath, which we mixed fresh every day, about one-third its quantity of powdered alum, or in the following proportion:

Hypo	1 ounce.
Powdered alum	160 grains.
Water	6 ounces.

The hypo is dissolved first, then the alum. A milky solution results, which will not deteriorate by one day's use. It is better to use the solution fresh. The white portions of the prints in this bath keep remarkably clear, and we think it is not necessary to use the acidulated water after development as recommended.

After the prints are squeegeed face downward on the rubber plate, and the surface water on the back dried off with blotting paper, the print may be dried in a draught of warm air very quickly—from 10 to 20 minutes—and then be easily pulled or stripped from the rubber.

Before the use of the mixed bath, from 40 minutes to an hour and a half was required.

Col. Russell.—With sincere sorrow do we learn of the death of Colonel Russell, so well known to photographers of a former period as Major Russell. The sad event took place on the 16th of May last.

The *British Journal of Photography* says: Photographers are more deeply indebted to Colonel Russell than many of them are aware. Quite apart from the able and skillful investigations he made in connection with the tannin process, and in preservative processes in general, and of the action of bromide of silver, he has made photographers his debtors for ever by giving them the alkaline developer and making them acquainted with the influence of bromide in the developer. He was a prolific contributor to photographic literature in former times, but during the last fourteen or fifteen years had resumed the more congenial life of a country gentleman of independent means on his estate of Stubbers, Essex.

He was born in 1820, and was a scion of a family settled in Essex for over two hundred years. His family name of Branfill—a name, we are pleased to say, not unknown in the photographic literature of the present time—was changed to that of Russell in obedience to the provisions of a will of the last of a neighboring and nearly related branch of the Russell family.

He made many discoveries in photography, into which field he entered in 1856. It was in 1862 that he first published, in these pages, what has been termed "a matured and practical method of alkaline development," based on phenomena observed by Mr. Borda, of America, connected with the exposure of tannin plates to the vapor of ammonia.

Coloring Rubber Fabrics.

A recent action for infringement of a patent has drawn attention to the practicability of improving the manufacture of rubber or waterproof fabrics by printing upon them patterns or ornamental designs—an art that has been carried out successfully only during the last two or three years. Every one is familiar with the macintosh, and though it would perhaps be of little advantage if colored patterns could be readily printed on that, there are many articles made in rubber, both pure and vulcanized, which can be vastly improved in appearance by the addition of a little color or a pattern of some kind worked in the fabric. More than twenty years ago, attempts were made to print upon rubber fabrics, just as calico is ornamented with designs; but the colors were not fast, and the designs were not clear. A certain measure of success was attained when a fabric with a pattern already printed on it was coated with clear rubber, and a more satisfactory article was, perhaps, produced when some one hit upon the idea of placing the waterproofing between two pieces of fabric on one or both of which the pattern or design was printed. These latter productions were rather expensive, were, moreover, too heavy; but toward the end of 1883 a Mr. Moseley, of Manchester, obtained a patent for a method of producing ornamental designs on rubber waterproof goods which seems to have been so useful that it was soon infringed. In Moseley's process the fabric is rendered waterproof by one or more coatings of rubber, which may be colored or not as desired, and it is then covered with a film of farina, on which it is possible to print in colors by methods similar to those adopted by the calico printers. According to Sir H. Roscoe, the farina prevents the pattern from "running," while it readily takes the color, and is, in short, the secret of the success of the invention. When the farina is applied to the rubber-coated surfaces it adheres readily, and after a slight vulcanization is found to be firmly fixed; but if the vulcanization has been carried too far, or been performed too rapidly, the farina is easily rubbed off, and of course takes with it the colors of the pattern. Mr. A. Parkes, who invented cold vulcanization about 1846, thinks that water colors applied to an India rubber coated fabric covered with farina will always remain "fast," provided the vulcanization is completed; and it appears from experiments that water colors printed on rubber coated with farina are faster than those printed on a surface without farina, and that if the colors are dissolved in media which act on the rubber, they become still more "fast." The use of the farina is indeed the foundation of the process, for it combines readily with the rubber, and the colors fix well on the farina, the success of the patentee's process being due to the fact that the printing of the design is done on the farina, and not on the rubber. The infringers had to send the prepared fabric away from their works to be printed, and accordingly they partially vulcanized it before sending it away, in order that the farina might not be rubbed off. The designs are printed in water colors, and subsequently a thin film of clear rubber is spread over, farina is dusted on, and the fabric is passed through rollers, which give the complete vulcanization. Dr. Burghardt, who made a microscopical examination of the infringer's product, agreed with Sir H. Roscoe as to the absorbent action of the farina. It does not make the colors absolutely fast; but it has a very "fixing" effect on them, really inclosing the dye and acting much like a mordant. The case was settled in the plaintiff's favor, the validity of the patent being fully established. The attention drawn to the process by the action will probably lead to its more extended utilization, for vulcanized rubber in certain conditions has a very long life, and if it can be ornamented with designs of a durable character, the extra cost will not prevent its adoption for many purposes.—*Eng. Mechanic.*

The Brake Trials.

The series of brilliant trials just concluded at Burlington, Iowa, has especial interest as an exhibition of the development of the train brake, and it marks a long step in the application of continuous brakes. It is eight years since the remarkable experiments of Mr. Westinghouse and Captain Douglas Galton put the problem of continuous brakes on a scientific basis. It is only five years since Edison patented his electric train brake, which consisted of a disk attached to a car axle and revolving within the field of a big horseshoe magnet, and intended to arrest the train by the magnetic resistance encountered when the circuit was closed. It is not a great while since men stoutly contended that the automatic brake was an evil because it stopped trains. The undoubted result of the Burlington trials will be the speedy application of continuous brakes to freight trains, and the use of electricity to actuate them, for emergency stops at least. The delicacy and precision with which the brakes can be manipulated by electric attachments had hardly been suspected until these trials.

Another result of the trials is to call attention again to the question of common action among the railroad companies for experiments and tests. Interchange of cars is forcing this subject forward as regards car couplers, and it will probably soon come up in relation to heating apparatus. But there are other matters, not directly involved in the interchange of cars, which could well be investigated by the railroads in common.

Individuals and companies have long labored with a fine scientific spirit to perfect our knowledge of railroad appliances in all directions. The Altoona laboratory is a steady source of knowledge. The Master Car Builders' and Master Mechanics' Associations have done an invaluable work in determining standards and improving appliances, and their investigations have owed much to the liberality of various companies in providing place, appliances, labor, and power.

Of course it is in this same way that by far the greatest progress must be made in future. The most fruitful research must be carried on by individuals working privately. The conditions of anything like competitive tests or experiments are not often favorable to close and accurate investigation. Men cannot be set to thinking to order with the best results; nor would it be practicable or desirable to establish a general railroad bureau of tests and investigations. A bureau organization is open to the danger that its members become attached to theories and wedded to old ways. In its nature it is narrowing, and breeds prejudice. The French Academy has done its work in the conservation of the French language and literature, but progress has been made in spite of the Academy. On the other hand, there are always questions for experiment and study which are so large in their scope and so expensive to carry out that individuals cannot undertake them and railroad companies are very reluctant to; and it is to deal with such questions that concerted action among the railroad companies is almost necessary. The Chicago, Burlington & Quincy has made it possible to carry out a most valuable series of experiments, the cost of which might well have been shared by several of the railroad companies; and it would be well to consider an arrangement for undertaking other investigations in common, specially fitted men to be detailed for special studies, and the labor and expense to be divided somewhat in proportion to the benefit to be derived.

Probably the results of the experiments on tight and slack coupling are not yet convincing to all those who are most interested in the subject, and it is not likely that the coupler tests shortly to take place will settle the matter.

A series of experiments to accurately determine train resistance under different conditions of speed, grade, and curvature ought to be undertaken. This is perhaps one of the most important investigations that could be made. Starting with the valuable body of knowledge of the subject already accumulated, we might hope, by thorough experiments now, to arrive at laws that would be indisputable.

It is needless to multiply subjects for such experiments. There are only too many of them.—*Railroad Gazette.*

Large Fires in New York and Brooklyn.

A street car depot, the Belt line, with stables and some thirty other buildings—tenement houses, factories, stables, and shanties was burned in New York in the early morning of May 27. The fire, fed by a large quantity of grain and hay within the stables, and fanned by a brisk wind, raged for some hours absolutely uncontrolled, despite the most strenuous efforts of the department, which was hampered in its work by a lack of water. Eleven hundred and eighty-five horses perished in the flames, and about four acres of ground were burned over, the money losses aggregating close to $700,000.

Following this, the large cooperage shop of Lowell M. Palmer, in the eastern district of Brooklyn, containing from 75,000 to 80,000 empty sugar barrels, was fired by a discharged employe and entirely destroyed. The next day another big shop belonging to Mr. Palmer, on the opposite side of the street, took fire from some unknown cause, and also burned to the ground.

The next fire was in Richard's eight story storage warehouse on King Street, formerly Booth & Edgar's sugar house. The building contained about 8,000 bales of cotton, besides a large quantity of wool, rags, molasses, and wine. The fire was caused by a workman who held a lamp too close to a cotton bale while reading a mark. The elevator shaft quickly conducted the flames to all parts of the building, the workmen barely escaping with their lives. The losses in this instance are estimated at between $200,000 and $250,000.

The time has come when the owners of non-fireproof buildings should be compelled by law to put in the automatic water sprinklers. Probably all the above conflagrations would have been prevented had these devices been in use in the premises.

The Living Earth.

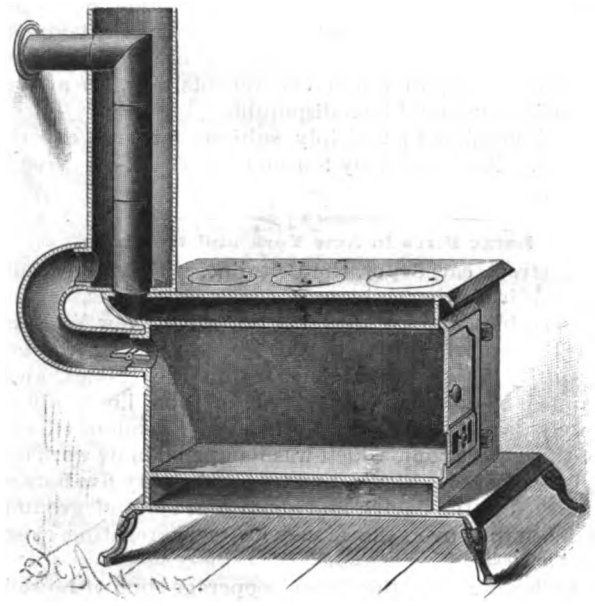
In a paper published in the *Indian Engineer*, an illustration is given of the life that dwells in nature, the phenomenon of earthquakes being cited. The peculiar terror of an earthquake lies mainly in the suddenness of its approach. Volcanic eruptions are usually preceded by vast rumblings, or jets of steam, or other unmistakable tokens. Hurricanes and cyclones, in like manner, have heralds that announce their coming. But with an earthquake there are no premonitory symptoms. The great earthquake which took place at Lisbon in the year 1755 found the people engaged in their ordinary occupations. All the shocks were over in about five minutes. The first shock lasted about six seconds. In that brief space of time most of the houses had been thrown down, and thousands of men, women, and children crushed beneath the ruins. At times the ocean lends fresh terrors to the scene. Thus at Lisbon a wave of water over 50 feet high rushed in among the houses, and covered what still remained. In the island of Jamaica on a similar occasion two thousand five hundred houses were buried in three minutes under 30 feet of water. Recent delicate scientific experiments have disclosed the fact that the surface of the land is never absolutely at rest for more than thirty hours at a time. Thus those great earthquakes which make epochs in history are merely extreme cases of forces that seldom sleep.

Freezing Mixture.

A liquid invented by Raoul Pictet, of Geneva, Switzerland, for use as a disinfectant, answers well as a freezing mixture for hardening microscope specimens. Sulphur dioxide and carbon dioxide, having been mixed and cooled, are compressed until they are liquid, and stored in siphons. When liberated, they rapidly evaporate, with great reduction of temperature. By this means mercury may be frozen, and animal or vegetable tissues rendered solid in a few seconds. It is as easily managed and more effective than ether, the odor being the principal objection.

COMBINED RANGE AND HEATER.

The illustration herewith is a sectional view, through the oven, of a novel construction of range, especially designed to furnish heat, if desired, to the upper rooms of a building. At the top and bottom are the spaces for the passage of smoke and the products of combustion to the pipe, in the usual way. The oven itself is, however, connected to a heat passage or drum by an opening in the rear, at the top, in which is a damper, and this heat passage leads to a larger heat pipe or flue surrounding the smoke pipe, and leading to an upper room. In the oven door is a damper and slide, so that, when the oven is not needed for baking, these may be opened to admit a current of air, to be there heated and sent through the damper at the rear into the flue leading up, the openings in both door and flue to be closed, however, when the oven itself is to be used. It



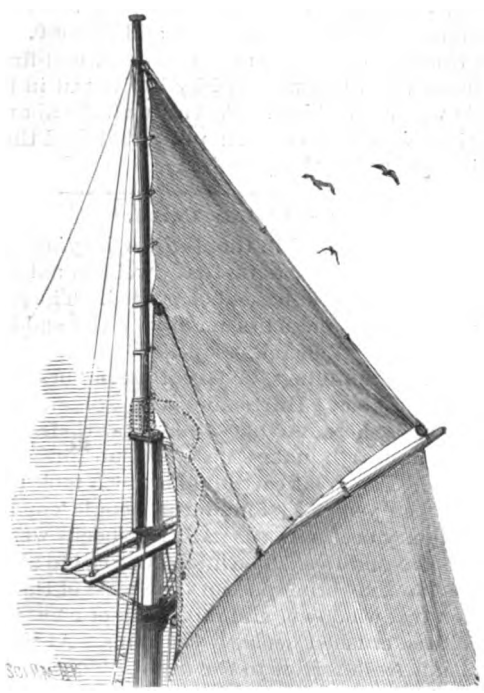
YOUNGMAN'S PORTABLE RANGE.

is not always necessary to the economical application of this method that the heating flue should surround the smoke pipe, and it is obvious that, instead of the curved pipe at the rear, two ordinary stove pipe elbows may be placed together to make an angular, but sometimes more readily obtainable, construction.

This invention has been patented by Mr. John P. Youngman, of Hazleton, Pa.

IMPROVED MEANS OF FURLING TOPSAILS.

According to the custom heretofore, the topsail clew line is made fast to the foot of the sail at or near the



LOVELAND'S IMPROVEMENT IN FURLING TOPSAILS.

tack, or to the body of the sail, running thence through a block secured to the clew of the sail, up over a second block fastened to the head, and thence to the deck; but, when the tack and sheet are loosened, and the sail thrashing, the sheet is apt to foul the block at the clew, as well as the clew line rove therein, and thus interfere with hauling in the clew line. This difficulty is obviated by the invention herewith illustrated, in which two brails are employed, the line of one being made fast to the lower outer corner of the topsail, from which it runs up along the sail, through grommets or thimbles, over a block at the head, and thence down at one side of the mast to the deck. The other line is made fast to a grommet secured in the foot of the topsail, about one-third of the distance from the tack to the clew, and this line runs up over a block secured to the luff of the topsail, about a third of its length from the bottom, and thence down to the deck at the same side of the mast as the first line. In clewing up the topsail, the tack, or rope to hold the lower corner of the sail in position, and the halyard passing over the block at the masthead, are loosened in the usual way, and the brails hauled in, serving to draw in the clew and foot of the topsail to the points indicated by the termination of the dotted lines against the mast, where the sail bellies out in a ball, and the tackle is free. To utilize this means of furling sails, no alterations in the sail or new running gear are necessary, further than an extra brail.

This invention has been patented by Mr. William T. Loveland, of New Gretna, N. J., and for particulars address John Curtin, 98 West Street, N. Y.

Texas Marble.

The San Antonio *Light* says: When the San Antonio and Aransas Pass Railway was pushing its way to Boerne, the Beckmans gave the railway the right of way through their land, they holding something in the neighborhood of 2,000 acres directly in the line of the road and near San Antonio. In blasting the rock for a passage for the road, a peculiar hard rock was thrown out, which, on closer examination, proved to be the finest kind of pure white marble, and further investigations showed that the supply was practically inexhaustible. They are now making arrangements to open the quarries.

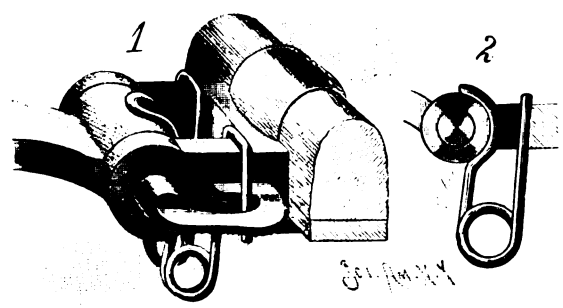
A COMBINED UNIFORM AND CIVILIAN'S BUTTON.

Those who have to appear occasionally in official dress, with buttons of a special design, but do not wish to afford a suit of clothes for that particular purpose, may, by the invention herewith illustrated, provide themselves with the required official buttons for such garments, so made that the tops of the buttons carrying the design can be readily removed, leaving the garments with only such appearing buttons as ordinarily worn on civilian's dress. In our engraving Fig. 1 shows the putting on of the design face over the ordinary button, Fig. 2 is a central sectional elevation of the button, and Fig. 3 represents details of the means of attaching the top. The main supporting ring, the inner one of Fig. 3, has a facing plate, above which is mounted a dome, held in position by a spiral spring. Clamping hooks are mounted between lugs or ears secured to the inner face of the main supporting ring, the upper ends of the hooks being connected by links to the under side of the dome, so that as the latter is forced downward the hooks will be carried to the position in which the hook on the left is shown in Fig. 2. Between outwardly extending flanges of the inner ring is fitted an outer ring, having wedge-like projections on its inner face, as shown in Fig. 3, and in applying the attachment this ring is turned so that the wedge-like projections will be moved to a position out of line with the hooks, when the dome is depressed, and the detachable portion applied, the points of the hooks engaging in a groove formed around the outer edge of the civilian's button, which is so constructed for use with this attachment. The attachment of the button to the garment may be by sewing or any usual means.

This invention has been patented by Mr. Louis D. Frenot, of No. 383 Mulberry Street, Newark, N. J.

A SECURE AND NON-RATTLING THILL COUPLING.

Our illustration so plainly pictures the novel features of a simple thill fastening that its construction and application will be readily understood, Fig. 1 showing the device in perspective, as connecting the thill to the wagon axle, and Fig. 2 being a sectional view illustrating the spring clasp of the fastening upon the eye of the shaft iron. The bolt, as will be seen, is of novel construction, being formed with a hooked head, the point of the head being carried around so as to extend toward the shank of the hook, and leave ample space for conveniently attaching the fastening. The latter consists of a single length of spring wire that is centrally bent to form the loop shown around the inside of the eye of the shaft iron in Fig. 1, the two lengths then extending downwardly, where each is shaped into a single coil and carried upward and bent over the extensions of the axle clip on either side, one end thus securely holding the hooked head of the bolt to



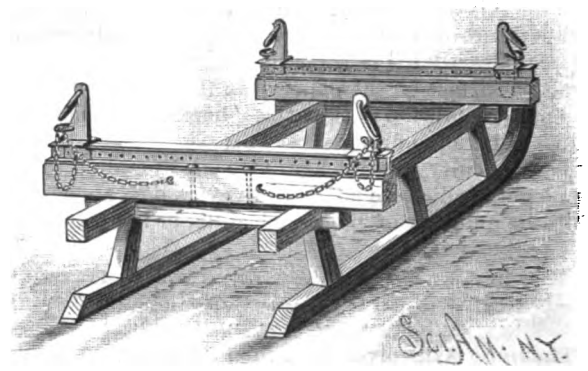
TORRANCE'S THILL COUPLING.

the axle clip. The bolt is also formed with an aperture at its farther end, in which a cotter may be used in case the fastening attachment is lost or damaged.

This invention has been patented by Mr. John Torrance, of Chetopa, Kansas.

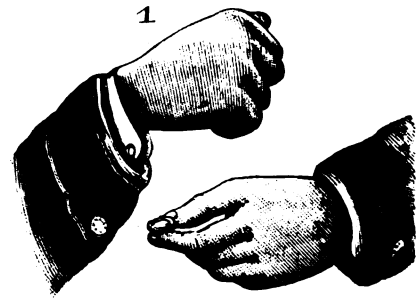
A TIMBER BUNK FOR SLEIGH OR OTHER VEHICLE.

Lumbermen using the imperfect means heretofore employed for securing logs or timber to sleighs, wagons, cars, or similar conveyances, will appreciate the simple and efficient device presented in the invention of Mr.



DANIELSON'S TIMBER BUNK.

Danielson, which will be readily understood by reference to the illustration, where the bunk is shown as applied to a sleigh. The device comprises a cross bed beam, to which there is bolted a double angle iron, upon which are mounted two sliding blocks having downwardly extending side flanges, fitting against the web of the angle iron. The web has a number of apertures for the reception of a retaining pin carried by a chain attached to each of the blocks, whereby the blocks, when moved forward or backward into any desired position required for the support of the load, may be firmly held where placed. The blocks, to prevent their



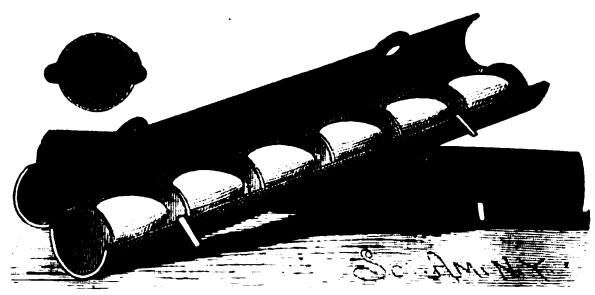
FRENOT'S CONVERTIBLE BUTTON.

being lost or misplaced, are permanently attached by a chain to the bed beam. The blocks also have swinging rings, through which binding chains may be passed, such as it is sometimes necessary to throw over the load to more securely hold it in place.

This invention has been patented by Mr. John A. Danielson, of Calumet, Mich.

IMPROVED PACKAGE FOR CARRYING EGGS.

A cheap, simple, and convenient egg case or holder, in roll form, by the use of which eggs may be car-



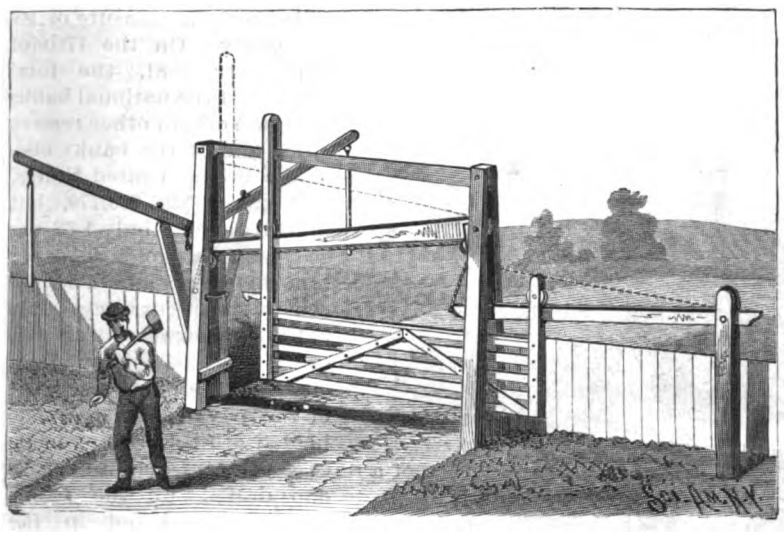
FRAZEE'S EGG CARRIER.

ried with little risk of breakage, is shown in the accompanying illustration. The body of the package or case may ordinarily be made of pasteboard, bent to the required form, and the lid may be made integral with the main portion by longitudinally slightly incising the roll thus formed, on its inner face, so that the two parts will thus be hinged together. The interior of the holder is divided into the desired number of compartments, each to hold an egg separately, by partitions in the form of a disk, as shown in the small figure, each disk having ears or projections made at opposite sides, which fit in slots made in the body portion, and in the joining body and cover portion, of the holder. These partitions may also be made of pasteboard or of wood or other suitable material. When the package is to be much handled, the eggs should be wrapped in paper, cotton, or other flocculent or suitable material. To hold the roll closed, suitable pliable catches are provided.

This invention has been patented by Mr. John Frazee, and for further particulars address P. L. Tourchy, 3½ Carondelet Street, New Orleans, La.

AN IMPROVED SLIDING GATE.

The invention herewith illustrated covers a gate construction which presents several novel features. The gate is of the kind intended to be readily opened by one approaching it in a vehicle or on horseback, without alighting, and as readily closed after passing through. To a post at the right side, at a distance of the length of the gate, is pivoted a bar which extends through the upper end of the rear stile of the gate. This bar has on its upper face a metallic track, upon which rides a roller mounted in the upper end of the



VON STEIN AND WHITE'S GATE.

rear stile, the bar also extending through one of the double posts of the main gate frame. Another bar pivoted higher up in this double post, and carrying a like track on its upper face, extends across the roadway, through the upper end of the forward stile, and between the standards of the other double post, a roller mounted in the forward stile also riding upon the track on the upper face of this bar. To the inner end of the first bar is attached a rope or chain, which passes over a sheave on one end of the other bar above it, the rope passing along the under side of the latter bar, and over a second sheave, to a fastening on the post at the forward end of the gate. The upper pivoted bar, the one extending across the roadway over the gate, as seen in our illustration, is supported on its forward end by links connected to levers which extend out on either side of the roadway, these levers having swinging handles. To open the gate, a pull upon one of these handles raises the two bars carrying the tracks upon which the rollers in the stiles ride to the position shown in the dotted lines, when the gate rolls back from the road, and is held open, though slightly raised from the ground, through the medium of the levers and their swinging handles, the weight of the latter being so adjusted as to slightly overbalance that carried by the short arm of the levers. To close the gate, one of these levers is pushed upward, when the track-supporting bars are moved so that they incline downward, and the gate rolls to its closed position.

This invention has been patented by Messrs. James P. Von Stein and Henry A. White, of North Liberty, Johnson County, Iowa.

A Mechanical "Porpoise."

At a recent meeting of the Liverpool Engineering Society, a paper was read by Mr. J. F. Waddington on "Submarine Vessels." In commencing the paper the author said that there were records of submarine vessels as far back as 1648, and a very interesting series of experiments were made by Fulton in 1801. Submarine vessels, he stated, were used in the American civil war, and numbers of patents had been taken out in America. He then referred to the submarine vessel Resurgam, designed by Mr. Garratt, and tried in the Birkenhead Float, in 1879, and also to the Nordenfelt boats. His own submarine vessel, the Porpoise, which was tried last year, was then described. She was 37 feet long by 6 feet 6 inches beam, and was propelled by electricity. The Porpoise was submerged when under way by means of inclined planes, which, when the buoyancy of the vessel had been sufficiently reduced by letting in water, were set over at an angle, and so guide the vessel below the surface. He also described the horizontal propellers working in vertical tubes used in his boats for the purpose of diving below in cases of emergency when there was no way on the boat. The tendency of submarine vessels to dive by the head when going at any speed was prevented by means of a horizontal rudder. Compressed air for consumption by the crew was carried in two compartments at the ends. For the propulsion of the vessel and for driving the various machinery on board, electricity was stored in 45 accumulators of 600 ampere hours' capacity. The author stated the speed of the boat with the 6·77 horse power available would be about 8 miles per hour, at which speed she would be able to run a distance of 80 miles.

IMPROVED BACKUS FURNACES.

This furnace, which is one of the newest types manufactured by the Backus Company, of 505 Fort Street, West, Detroit, Mich., and for which they have been granted a patent, has for its object the complete consumption of the products of combustion before reaching the furnace chimney. The principal features of the chimney are a brick arch abutting against the door, and having air ducts leading from the ash pit up to the spring of the arch, for increasing the draught and introducing increased quantities of oxygen. The dump grate is pivoted behind next to the bridge wall, which is made elongated and receding. Through the flues or ducts a large quantity of air is admitted at the front, and then passing over the fire, under the arch, mingling and igniting with the carbon beyond the arch, insuring a perfect combustion of the gases before they reach the surfaces or flues of the boiler. The complete burning of the fuel that here takes place gives clean flues and a rapid radiation of heat, a large economy of fuel and a smokeless chimney. Cut No. 1 shows the furnace as used with an ordinary boiler. The other engraving represents a furnace constructed to burn shavings and light fuel, and is admirably adapted for use in planing mills and woodworking factories.

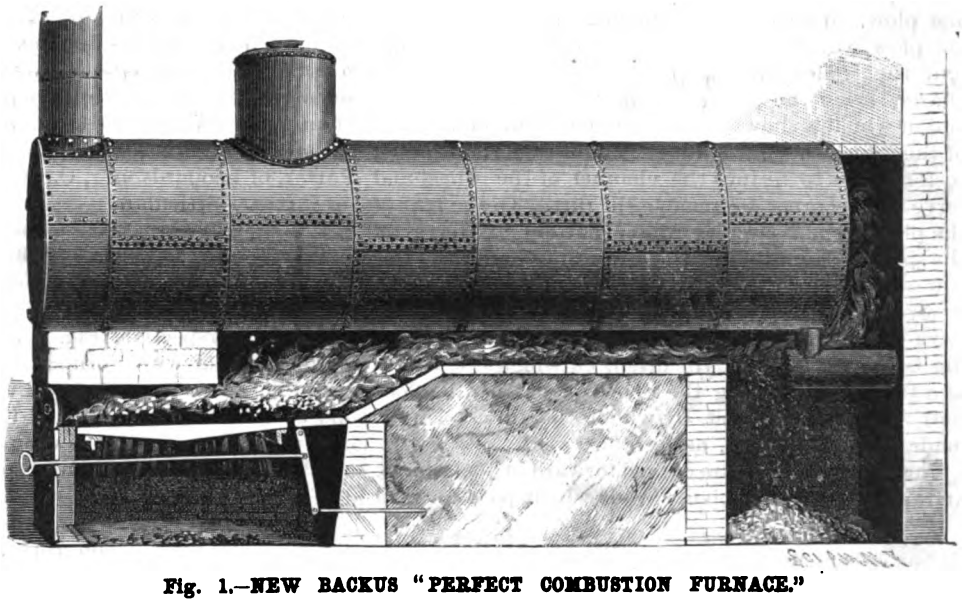


Fig. 1.—NEW BACKUS "PERFECT COMBUSTION FURNACE."

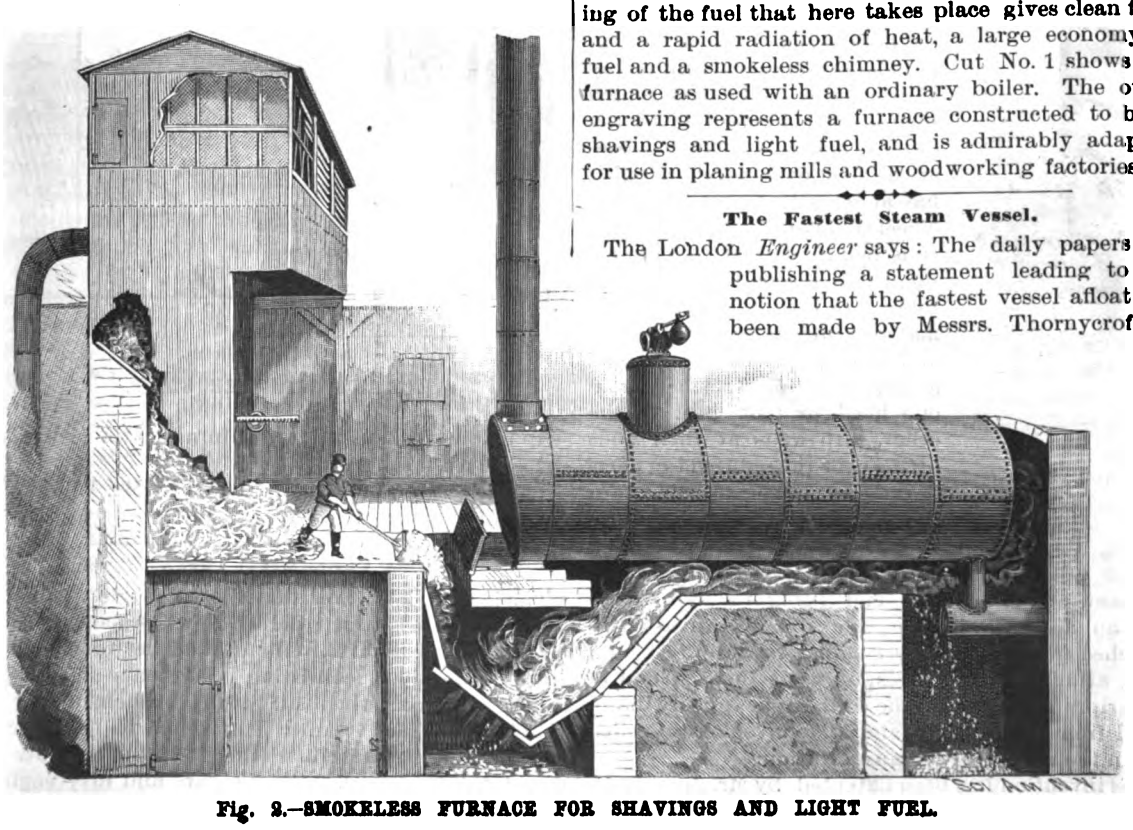


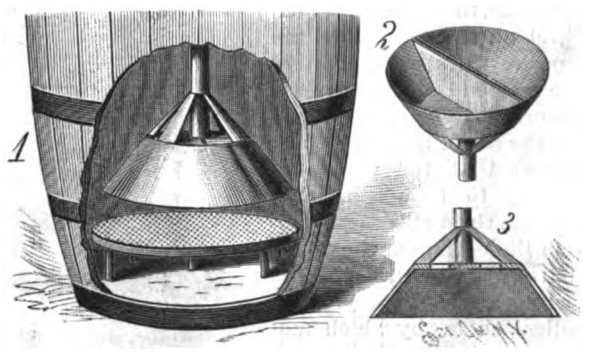
Fig. 2.—SMOKELESS FURNACE FOR SHAVINGS AND LIGHT FUEL.

The Fastest Steam Vessel.

The London *Engineer* says: The daily papers are publishing a statement leading to the notion that the fastest vessel afloat has been made by Messrs. Thornycroft & Company, who, "in making preliminary trials of a torpedo boat built by them for the Spanish navy, have obtained a speed which is worthy of a special record. The boat is twin screw, and the principal dimensions are: Length, 147 feet 6 inches by 14 feet 6 inches beam, and 4 feet 9 inches draught. On a trial at Lower Hope on May 27, the remarkable mean speed of 26·11 knots was obtained, being equal to a speed of 30·06 miles an hour, which is the highest speed yet attained by any vessel afloat." If our readers will turn to our last impression, they will see that Messrs. Yarrow & Company have attained as a maximum with a similar boat a speed of 27·277 knots, or 31·44 miles per hour.

AN IMPROVED CLOTHES WASHER.

The invention herewith illustrated consists of a novel



FAUNTLEROY AND OSBORN'S WASHING MACHINE.

dasher, in the shape of an inverted, flaring cup, in combination with a perforated platform, supported above the bottom of the tub, for holding the clothes in position to allow the water to freely pass through them. Fig. 1 shows the device in partition for use as in an ordinary tub, with the wall partly broken away, and Fig. 2 is a view of the dasher inverted. The dasher is divided diametrically by a hollow position, which forms an air passage communicating between its lower part and the space above through two apertures, indicated in Fig. 3 on either side of the handle. The ferrule which receives the handle is attached to the center of the cup, and is strengthened by diagonal braces connected with the ferrule and with the top of the cup.

This invention has been patented by Messrs. John B. Fauntleroy and Chester S. Osborn, of De Kalb, Mo.

Solidification of Petroleum.

Dr. Kauffmann is at present making some experiments for the Russian government, with the view of finding a process of solidifying the petroleums used as fuel. According to report, his process consists in heating the oil and afterward adding from one to three per cent of soap. The latter dissolves in the oil, and the liquid upon cooling forms a mass having the appearance of cement and the hardness of compact tallow. The product is hard to light, burns slowly and without smoke, but develops much heat and leaves about two per cent of a hard, black residuum.—*Annales Industrielles.*

A New Asparagus.

Some little interest has been excited by the announcement of the discovery of a new and remarkable variety of asparagus on the steppes of Akhal-Tekiz. It has not been botanically identified, but it is represented as growing perfectly wild, the stalks being nearly as thick as a man's arm and attaining a height of five or six feet, so that one of them is said to suffice ten Russian soldiers for a meal. If the preference of experts for wild asparagus finds justification in this variety—and its flavor is described as equal to that of the best European kinds—asparagus lovers may have a good time before them.

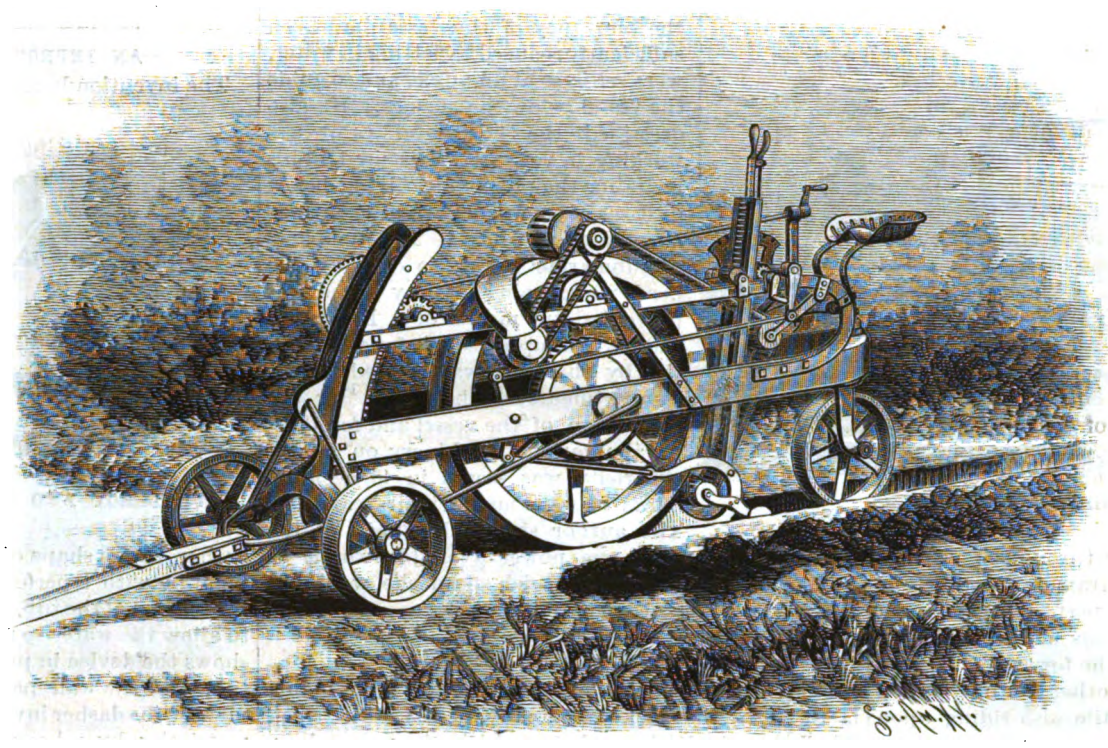
AN IMPROVED DITCH MAKING MACHINE.

The invention illustrated herewith is designed to facilitate the making of ditches, with smooth and graded bottom, for the laying of drain tiles, sewer pipes, and all other purposes where such excavation may be required, the machine, as may be seen by the illustration, cutting out the work smoothly and evenly, and depositing the earth well to one side of the ditch.

The frame of the machine consists of two pairs of side bars, connected at their rear ends by a curved bar, and at their forward ends attached to two parallel curved bars, there being on the inner sides of the latter pivoted rollers which rest and roll upon the side flanges of a central bar similarly curved, rigidly attached to the center of the arched front axle, the wheels of which travel on the ground at the opposite sides of the ditch. The rear end of the machine is supported by a caster wheel, and the rim of the large wheel journaled at the middle is grooved to form a channel in which the dirt is carried up from the bottom of the ditch. To the side of this wheel is secured a wheel carrying an endless chain, by which motion is communicated, through the intermeshing of the teeth of a chain wheel and another endless chain, to the chain wheel seen at the top of the picture, which operates the dirt-carrying chain, formed in a special way of plates and links, to bring up the earth from the rear of the plow. This chain passes backward and downward, over a pulley on a swinging support, held back by a spring, to give the desired tension, thence slightly forward and down around a small wheel pivoted to supports attached to the standards of the plow, in such a position that the dirt raised by the plow will be carried up and between the chain and the channeled rim of the large wheel, and discharged upon the ground from the spout, the outer end of which is shown just over the front of the top of the large wheel, the inner end of the spout being so formed as to fit into the channel of the wheel and serve as a scraper to remove the dirt. To the rear of the plow are also circular rotary cutters, to shave off the sides of the ditch at the opposite sides of the furrow, so that the ditcher in its next passage can move freely and without binding, it being the design to have the machine obtain the required depth by driving back and forth in the ditch, cutting a few inches at a time, and grading the depth of cut by the foot rods at the driver's feet, by which the furrow can be made deep or shallow, as desired.

The plow standards are curved forward in hook shape, and to their ends are pivoted rods which pass forward to levers pivoted in front of the large wheel. To the upper ends of these levers are pivoted rods, which run back to crank arms upon a short shaft, to which is attached the upright lever seen in front of the driver's seat, and next which is a spring lever pawl, by which the pitch of the plow can be regulated and the lever held in its position. Between the plow standards is also pivoted an upright bar with rack teeth, engaging with gear wheels attached to cranks, upon which rest the driver's feet, the pushing of one foot forward raising the plow to cut a shallower furrow, and the pushing of the other foot lowering the plow to cut a deeper furrow.

It being the design of the machine that the front wheels shall travel on the ground at either side of the ditch, while the others travel in the trench as it is being made, the connection of the frame with the front axle is made in such way that the large wheel, with the plow and other attachments, can be readily raised and lowered, by the turning of the crank in front of the driver's seat, the shaft leading therefrom being connected with a beveled gear wheel and a pinion wheel firmly attached to the frame, and engaging the rack teeth on the curved bar rigidly attached to the forward axle.



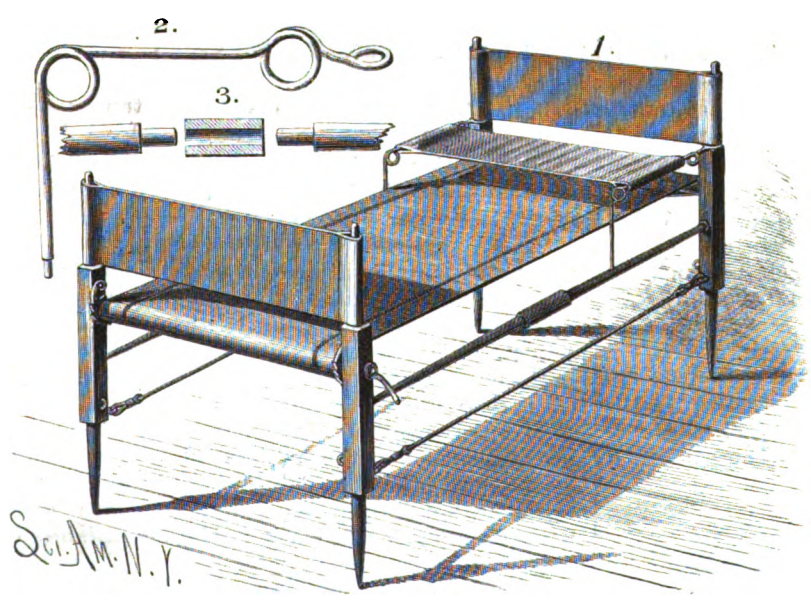
POTTER'S TILE DITCHER.

With this construction the driver can readily lower the forward end of the frame, lowering thereby also the large wheel and plow to remove another slice of earth from the bottom of the ditch, and can raise it when desired. The machine is designed to cut from 150 to 200 rods of ditch per day, from two to three feet deep, with smooth and graded bottom, requiring for this the labor of only one man and a team of horses.

This invention has been patented by Mr. Herman I. Potter, of Leonardsburg, O., who should be addressed for further particulars.

AN IMPROVED PORTABLE BED.

A light and easily set up portable bed is shown in the accompanying illustration, in which Fig. 1 gives a view in perspective, Fig. 2 a representation of the angular spring wire forming the head rest support, and Fig. 3 a sectional detail of the middle part of one of the main stay rods at the side. The four corner posts have each a lower pointed part, a larger middle section, and a reduced top rod or bar, the middle section of each post having near its lower end screw eyes, from which side and end ropes, with snap hooks at their ends, connect the four posts together. The head and foot posts are also connected by the stay rods, each made of two rods, held together in the middle by the hollow sleeve shown in Fig. 3. The head posts are united by a removable stay, over which slips a welt on one end of the canvas mattress, which passes at the foot over a roller, which has at each foot post a ratchet wheel engaging a pawl, the roller ends being adapted to receive a small crank arm by which the roller can be turned and the mattress drawn taut. The foot and head pieces each consist of a canvas strip, stretched from one head or foot post to the other, with welts at their ends fitting over the reduced top parts of the posts. The adjustment of the angular spring wires supporting the head rest will suggest itself, the loop at one end slipping over the smaller top part of the post, and the other end being reduced to fit into an aperture in the side rod, a canvas strip stretched from side to side forming the head rest, and being attached to the wires by welts on each end of the strip. The parts of the bed can be quickly disengaged from each other, and all conveniently rolled within the mattress for transportation.



STROUT'S PORTABLE BED.

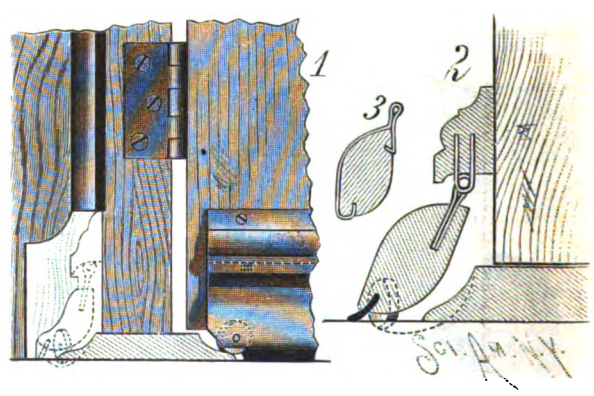
This invention has been patented by Mr. Joseph M. Strout, of Portland, Me.

Money in Circulation.

At the present time, deducting the money held by the Treasury and the banks, the amount of circulation really in the hands of the people can hardly fall, says the Baltimore *Sun*, much short of $900,000,000, or about $16.25 to every man, woman, and child in the country. This amount amply suffices for the business needs of the United States, supplemented, as it is, by the use of checks and drafts. So extensive is the use of checks and drafts at the present time, alongside of coin and other recognized forms of money, that it may be questioned whether the quantity of cash in a community is as much now as formerly a measure of its prosperity. On the 17th of September, 1881, the total receipts of the national banks in New York, in other reserve cities, and of the banks elsewhere in the United States, aggregated $295,233,779, but of this amount only 1·38 per cent was in gold, 0·17 per cent in silver, and 4·36 per cent in paper currency, while 94·09 per cent were in checks, drafts, etc. In New York city less than one per cent of the payments were made in gold or in currency, while 98·86 per cent were in checks and drafts. In the banks elsewhere, and not in the reserve cities, 3·31 per cent of all payments were made in gold, 0·68 in silver, 14·27 per cent in currency, and 81·74 per cent in checks and drafts. From this exhibit of the amount of business transacted in one day and in a few cities by means other than gold or silver coin or currency, it is evident that the silver enthusiast and the greenbacker may very well overestimate the importance of their respective hobbies.

A WEATHER STRIP FOR THE BOTTOMS OF DOORS.

The invention herewith illustrated is designed to provide a device which is automatic and noiseless in its action. Fig. 1 represents a longitudinal vertical section through the door frame, with the casing and door partly broken away, illustrating in positive lines the application of the device upon an open door, and in dotted lines the position of the strip when the door is closed, Fig. 2 being a transverse vertical section through the applied strip. To the lower portion of the door is attached a moulding, with a recess on its under side, in which is a series of staples. The weather strip, of wood or other suitable material, is of rectangular form, with its opposite corners rounded, as shown, carrying eyes in the top, by which, with the aid of a rod, it can be hinged with the staples on the under side of the moulding. In the curved lower edge of the weather strip is inserted a strip of rubber, and in the corner of the strip next the hinged side of the door, in the under edge, is journaled a roller, which travels noiselessly upon the saddle as the door is opened and shut, as the door is closed the roller dropping into recesses formed for it, and the weather strip fitting in the concave surface of the saddle, forming a complete seal. Fig. 3 shows the strip made with a metal facing, in which the facing and strip are made integral.



ALLAN'S WEATHER STRIP.

This invention has been patented by Mr. William R. Allan, of Pittston, Pa.

A Large River Cargo.

The largest load ever taken by a single steamboat down the Mississippi reached New Orleans, La., recently. The Joseph B. Williams had the tow made up on the Ohio River, consisting of 39 boats and barges loaded with coal; the load, 826,011 bushels of coal, or 31,388 tons. The steamer is attached to the rear of the tow, guiding and controlling it in the current. It would take about 2,000 freight cars and fifty engines to bring the load by rail.

ALEXANDER AGASSIZ.

(*Continued from first page.*)

He made an expedition in 1875 to the west coast of South America, for the purpose of examinfng the copper mines of Peru and Chili. During this time he also made an extended survey of Lake Titicaca, and with the aid of his assistant, Samuel Garman, gathered an immense collection of Peruvian antiquities, which are now in the Peabody Museum at Cambridge. These collections represent the antiquities of the lake, of old Trahuanaco, and of the shore Indians at Ancon.

In 1875 he was invited by Sir Wyville Thompson to assist him in arranging and making up the collection of the great English exploring expedition of the Challenger. A portion of these collections he brought with him to Cambridge, and there wrote his report on the sea urchins of this famous expedition, which ranks high as a contribution to original research. His previous investigations on the Echinoderms gained for him, in 1878, the Walker prize of $1,000 from the Boston Society of Natural History. This was the first bestowal of the Walker prize. In 1878 he received the "Prix Serres," awarded only once in ten years, from the Academie des Sciences de Paris, and was the first foreigner to secure this distinction.

From 1876 till 1881 Mr. Agassiz spent his winters in deep-sea dredging, having had placed at his disposal, by the superintendent of the coast survey, the steamer Blake. These expeditions have enabled him to explore the deep waters of the Gulf of Mexico and of the Caribbean Sea. The success that has attended his trips has been very great, mainly, he says, from the interest shown by the commanders of the Blake, but much more, we are persuaded to believe, through his own great ingenuity and special familiarity with hoisting and mining machinery, which has enabled him to introduce new methods in place of the old ways of deep-sea dredging.

In 1887 he received the degree of LL.D. from the University of Cambridge, England. He was elected a member of the American Association for the Advancement of Science in 1869, six years later he became a fellow, and in 1879 was made vice-president. At the Boston meeting, held in 1880, he delivered his retiring address on "Paleontological and Embryological Development," in which he took a decided stand against the prevalent development theory. In 1866 he was elected to membership in the National Academy of Science and held the office of foreign secretary till 1886, since when he has entirely severed his relations with that organization, owing to the impaired condition of his health.

Mr. Agassiz is likewise a member of the following societies: The Academy of Natural Sciences, Philadelphia; the New York Academy of Sciences; the American Philosophical Society, Philadelphia; the Essex Institute, Salem, Mass.; the Society of Natural History of Montreal, Canada; the Geological Society of Manchester, England; the Zoological, Linnean, and Royal Microscopical Societies of London, and other less famous foreign societies.

His bibliography includes numerous titles in the "Proceedings of the Boston Society of Natural History;" "The Annals of Lyceum of Natural History," New York; "Proceedings of the American Academy of Arts and Sciences," Boston; "American Naturalist," "American Journal of Science," and the "Archiv der Zoologie." They are principally on subjects connected with marine zoology. The "Report of the Anderson School of Penikese," 1873, and the "Reports of the Museum of Comparative Zoology," from 1873 till 1885, are by him. To many of the "Bulletins" of the museum he has contributed valuable papers; and of the "Memoirs of the Museum of Comparative Zoology," he is the author of "Revision of the Echini," "Echini of the 'Hassler' Expedition," and "North American Starfishes." Besides the foregoing, he has written, with Mrs. Elizabeth C. Agassiz, "Seaside Studies in Natural History" (Boston, 1865), "Marine Animals of Massachusetts Bay" (1871), and the fifth volume of "Contributions to the Natural History of the United States," left incomplete by his father.

These great undertakings have unfortunately injured his health to such an extent that he has been advised to put aside all work and rest awhile. Early in May of the present year he started on a long voyage to Alaska, from which it is hoped he may return thoroughly recuperated and able to again prosecute his scientific labors.

Personally, Mr. Agassiz is a bright, intelligent, busy man, easily approached, something more than a man of science, abounding in liveliness, interested in all that concerns humanity, but too much occupied with special work ever to be idle. His life has been one of continuous development along the lines of which his genius or temperament has naturally led him. Though a Swiss by birth, he is essentially an American in his intellectual grasp and in all that belongs to his ordinary life.

Where so much has been done since he gained the wealth which has enabled him to do what he thought best worth doing, what may not be looked for in the rich prime and afternath?*

* Julius H. Ward, in the *Harvard Register*, December, 1886.

Correspondence.

Scientific Improvement of Beef.

To the Editor of the Scientific American:

I desire to call your attention to a few physiological experiments recently made in the laboratory of Dr. Hal. C. Wyman, of Detroit, which may have a bearing upon certain economic questions. The experiments consisted in dividing certain nerves which supply motion and sensation (I will say certain spinal nerves) to the muscles in the necks of rabbits, and carefully noting the results. A large number of rabbits were experimented upon, and a careful microscopical examination made of the fibers of the trapezius muscles, which showed that such fibers had undergone fatty degeneration. This, however, is no more than what has been known to every physiologist and pathologist who has given any attention to the study of paralysis.

The nerves divided were the muscular branches of the inferior cervical nerves and that portion of the spinal accessory which supplies the trapezius muscle. The fiber of these muscles supplied by these nerves was found to have been very appreciably softened, and the writer desires to ask whether these experiments do not open a field for the study of processes by which the large, tough muscles of the necks of beeves may be converted into tender and more salable food. It is well known to all butchers that the most inferior portion of beef—that is, those parts which are most difficult to dispose of—are the muscles of the neck; and if experimental physiology can teach a method whereby this meat may be rendered more tender, digestible, and salable, a great good will have been accomplished.

The writer ventures to state that the studies promoted by Dr. Wyman are steps in that direction. It might be advanced as an objection that a division of the sensory and motor nerve of a muscle would result in its atrophy from disuse, and that the gain in quality would be lost in quantity. But the experiments dissipate such an idea, because there are left undisturbed sufficient of the deep muscles of the neck to maintain passive motion, insuring a fair amount of exercise and a reasonably good circulation of blood to maintain the volume of the enervated muscles.

Trusting you will give this matter space in your valuable journal, and that it will invite discussion, I have the honor to be, etc., ZINA PITCHER, M.D.

Detroit, May 26, 1887.

The Destructive Power of Torpedoes.

To the Editor of the Scientific American:

Having noticed your article on the power of torpedoes, I send you an account of the destruction of the Chinese corvette Yang Wo during the fight between the French and Chinese at Foochow. The French flagship had two torpedo boats attached to her. They were stationed on either side of her, at the gangways. This ship was about 300 yards below the Yang Wo. As soon as the firing commenced, both boats attacked the Chinese vessel. The first one fired her torpedo directly under the Yang Wo's after gangway—starboard side. No damage whatever was done to the ship, but the officer in charge of the torpedo boat was wounded in the chest by the return action of the torpedo. The other boat had in the mean time attacked the ship forward, a little abaft the cathead, on the same side. This torpedo was in direct contact with the ship. The effect was, when the torpedo exploded, that it penetrated the fore magazine (or, I should say, the fire from it did). This blew up, and the whole forward part of the ship was demolished. This all happened inside of three minutes. The remainder of the wreck drifted ashore, and burned for seven days. The Yang Wo was a wooden corvette of fourteen guns. The torpedoes used were booms—contact ones.

I was an eyewitness—in fact, too close a one. One of the torpedo boats was lost afterward at Samtur, Formosa, but in what manner the French have never stated. She is simply put down in their list as lost.

Gakow, April 27, 1887. AN EYEWITNESS.

Rapid Railway Building.

A correspondent of the St. Paul *Pioneer Press* thus describes some rapid railway construction:

"Just beyond this point, and eighty miles west of Minot, the traveler finds himself at what railroad men call 'the front,' or the end of the track of the extension which the Manitoba Railway Company is now making to Great Falls, Mont. To speak more accurately, this was the end of the track yesterday, but to-night that point will be five miles further westward, and by to-morrow yet five miles further. From Minot here the work has been in progress since the first week in April. From now on it is proposed to complete five miles of track each day, thus achieving the greatest feat ever attempted in the way of rapid railway construction. From here to Fort Buford the distance is a little over sixty miles, and it is the intention to have the road open to that point by June 1. Thence to Great Falls the distance is 403 miles, and trains will in all probability be running to that point before the middle of September.

"It can readily be surmised that the accomplishment of this gigantic enterprise requires little less than an army of workers, and that is what one finds here. The number of men now at work is 6,600, and the number of teams 3,000. With this force it is hardly to be wondered that the dirt is flying at a lively rate. From here to seventy miles beyond Fort Buford there is one unbroken series of graders' camps. Fifty of these camps can be seen from one point some distance beyond White Earth. By June 1, between 3,000,000 and 4,000,000 cubic yards of earth will have been taken out, and by the time Great Falls is reached the amount will aggregate not far from 10,000,000. On the Canadian Pacific, during the whole of last summer, the amount of earth handled was 6,700,000 cubic yards, and this was considered a remarkable piece of work. A few figures may serve to give a clearer conception of what is involved in the construction of five miles of railway track in one day. A rail is 30 feet long, and there are consequently 352 to the mile, or 1,760 to every five miles. As each rail weighs 600 pounds, the amount of steel handled in one day aggregates 1,056,000 pounds. It takes 2,640 ties to the mile, or 13,200 per day. Thirty-six 200 pound kegs of spikes are used to the mile. There are 32 'spikers' to every five miles of track, each man of whom drives 840 spikes a day, which, at the average of three blows to the spike, gives 2,520 blows per man per day. A mile of rails takes 1,408 bolts, which are handled by fourteen 'bolters,' or 503 each per day. To avoid delays in the progress of construction by reason of rough country, it is the intention of the contractors to work five gangs of men in five hour reliefs during a portion of the time. Work will begin at 3 o'clock in the morning, and the darkness will be scattered by thousands of torches.

"With such an army of men and teams at work far from the centers of civilization, and in a totally unproductive country, it can be readily seen that the task of securing and distributing supplies is one of enormous magnitude. Indeed, there is little doubt that greater executive ability is required in this than in almost any other department of railway construction in the far West. Here at White Earth is, for the present, the headquarters of the supply train, consisting to-day of twenty cars filled with every conceivable thing necessary for man and beast. There is grain, flour, canned goods of all sorts, butter, hams, sugar, wagons, harness, plows, boots and shoes, pipes and tobacco—in fact, nothing is lacking. Every day sees a big hole made in the stock, and every day sees the hole replenished by incoming trains. Day before yesterday 15,000 bushels of oats were sent out by wagon and yesterday 5,000 bushels, all for distribution along the line for a distance of forty miles. From here on the trail along the line is marked by one continuous stream of freighters' teams distributing supplies to the various camps. The other day a herd of 170 head of cattle was driven in, and it seemed that there at least was enough meat for some time to come. A rapid calculation, however, showed that it would furnish only about ten pounds to the man. Already 250,000 pounds of flour and 500,000 bushels of oats have been purchased. Lovers of baked beans will learn with alarm that the supply of that luxury is about exhausted. A letter just received from one of the largest wholesale firms of St. Paul states that if the demand is to continue throughout the summer as large as it now is, it will be necessary to import from Europe. They say they have now secured all the beans that can be found in the United States, and that they have only enough to last this army here for two months.

"Another interesting feature of this train is the hospital cars, where the laborers suffering from disease or accident are cared for by a regular physician, assisted by several nurses, the expenses being met by a contribution of two cents a day from each laborer employed."

Luminous Paint in Theaters.

Herr Stehle, the Government Inspector of the Royal Bavarian Court Theater, has, according to *Iron*, given high testimony to the use of luminous paint as a safeguard against panic in theaters. Any explosion or disaster with gas leaves the exit passage of the theater in total darkness, and even if additional oil lamps were used, they would probably be extinguished by the air concussion. In the above named theater inscriptions in luminous paint are suspended over the exit passages, which direct the audience to the "way out" (*Ausgang*). "These placards, in spite of being exposed to the very poor light of the corridors in the daytime and the gaslight in the evening, are so luminous after the gas has been turned out that any one can gain the stairs in each corridor without difficulty." The *Lancet* says the precaution is so simple and inexpensive that we wonder it is not immediately adopted in all theaters. Indeed, we see no reason why its use should not be made compulsory. Surely some provision of the kind might be included in the theaters bill now before Parliament.

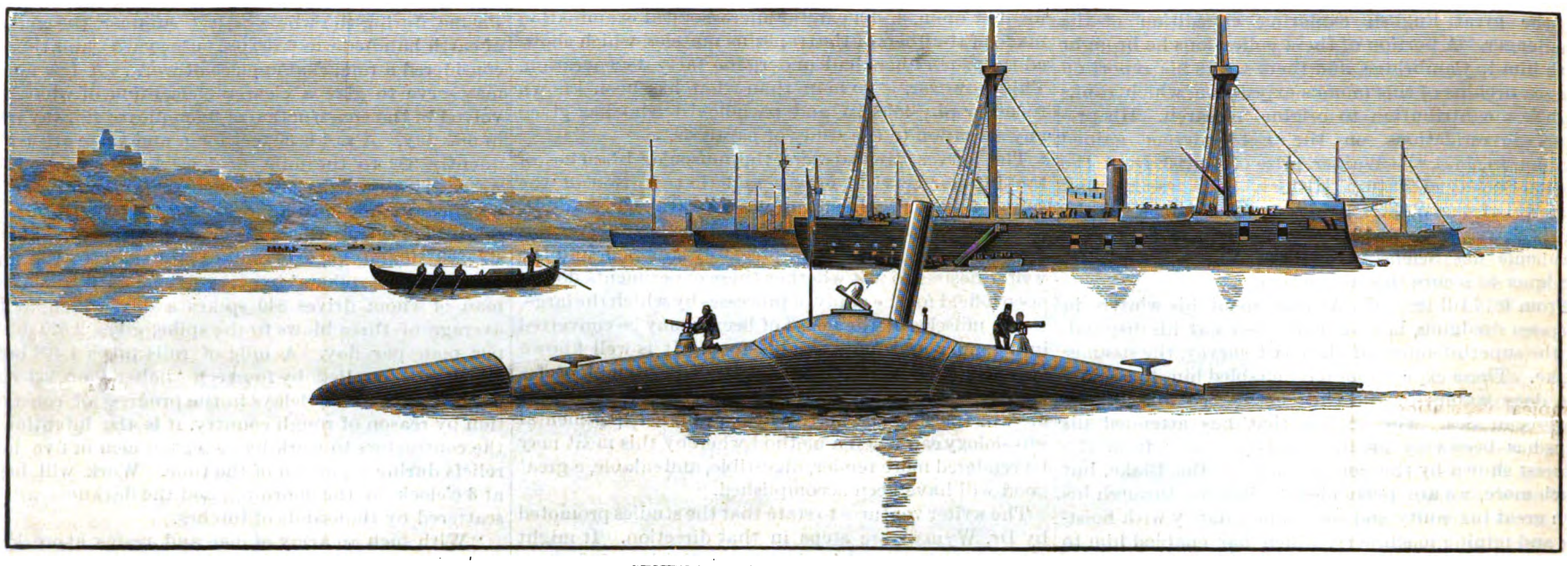
THE first street railway in America was completed in New York city in 1832.

THE NORDENFELT SUBMARINE BOAT AT CONSTANTINOPLE.

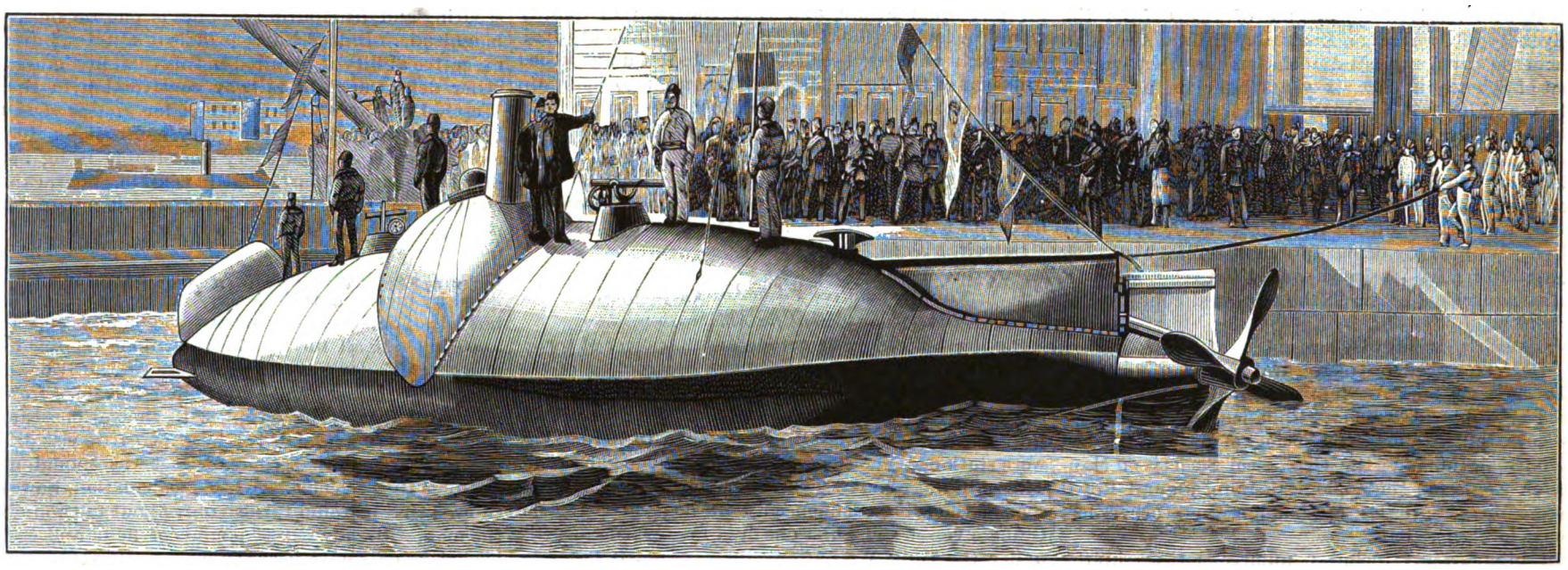
The modern Turks have ever shown much enterprise in providing themselves with the latest novelties in arms and munitions of war. Sultans Abdul Musjid and Aziz spent large sums in ironclads, while it was in a great measure due to the Martini-Peabody rifle that Turkey was enabled to make so prolonged a stand against Russia in the late campaign. They have now been experimenting with the new Nordenfelt submarine torpedo boat, two of which were ordered from the inventor last year, and being sent to Constantinople in sections, have been now remounted in the Imperial Dockyard. One of them was launched a few weeks since, and our engravings, from photographs by Mr. Bergren, of Constantinople, represent the little vessel in the various stages of "launching," of "making a voyage as a surface boat," and when "prepared for action." The boat is the largest of its kind as yet launched, being 100 feet long, 12 feet beam, 160 tons displacement, and is engined to 250 horse power. She is able to descend to a depth of 50 feet, to remain submerged some nine hours, and proceed at a maximum speed of ten knots. Her coal capacity is sufficient to enable her to steam for 900 knots without taking in a fresh supply, and she is furnished with the means for both attack and defense in the fish torpedoes carried in the case at the bows and the two Nordenfelt quick-firing guns, seen on the upper surface.

The great fact about the Nordenfelt system of torpedo boats is that the public demonstrations of its capabilities the year before last at Elsinore, of which we published illustrations, showed clearly enough that it had reached a really practical stage. It is not pretended that the boat can make a long submarine voyage. Indeed, one great drawback to such an attempt would be the impossibility of seeing ahead, as the submerged craft must come up to the surface from time to time to correct her course. The great advantage claimed over the ordinary torpedo boat is its capacity for approaching a hostile vessel unseen, as it is exceedingly difficult for the ordinary torpedo boat to get within striking distance of a war ship without being detected. As a surface boat, moreover, the Nordenfelt can undertake a long voyage, and, owing to the greater strength of its construction, is better able to defend itself against the attacks of other vessels. When about to attack, the boat is submerged by admitting water until the vertically acting screws seen in the upper surface are under water. A few revolutions of these screws suffice to send the boat under to any depth required, and by repeating their motion she can be kept stationary at any distance below the surface which may be desired. As soon as the motion of the screws ceases, the boat rises at once to the surface, owing to her spare buoyancy. The motive power is steam, and Mr. Nordenfelt can store up the heat necessary for its generation when the boat is submerged and combustion is no longer possible. In this particular boat there is sufficient steam power when she first goes under to drive her fifty miles without relighting fires.

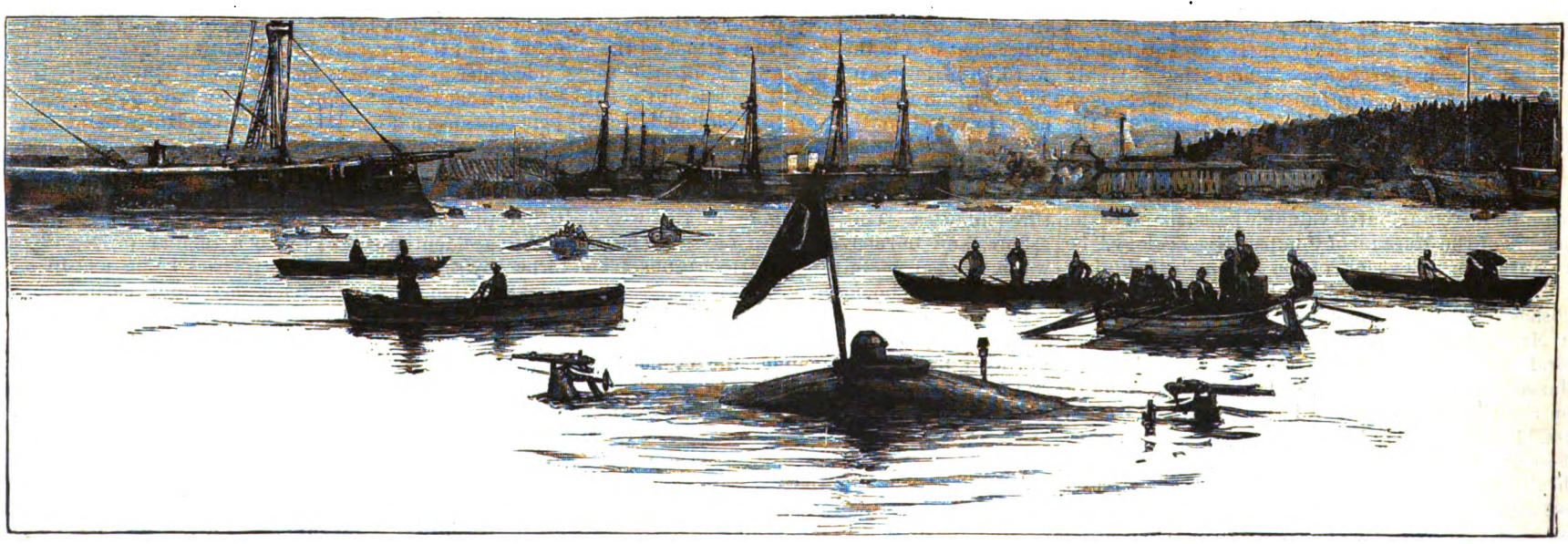
The last engraving shows the position for attack. As the boat approaches the enemy, she is brought lower in the water, until nothing but the small glass cupola is showing above the surface. There is no disturbance at the surface from the action of the screws to mark her passage through the water, and the cupola is too small an object in itself to arrest the eye of even the most wary observer, when a short distance off. The captain, with his head in the glass, carefully watches the movements of the enemy, directing his own boat toward her, and thus, stealthily approaching, the torpedo is sent on its mission of destruction as soon as the effective range, some three or four hundred yards, is reached.—*London Graphic.*



GENERAL VIEW OF THE BOAT.



BOAT IN THE DOCK.



THE BOAT SUBMERGED SHOWING THE MACHINE GUNS.

THE NORDENFELT SUBMARINE BOAT.

THE ROYAL PALM.

The royal palm is most appropriately named. It is royal in its characteristics, and in its entirety it has a royal aspect. We had enjoyed the glorious array of *the tree* in extended numbers in Havana. The palace of the Captain-General of Cuba is surrounded by magnificent examples in full growth. Their stately columnar trunks seem fitting accompaniments to the simple, yet dignified, architecture of the governor's dwelling. All palms are attractive, and many are surpassingly beautiful in their graceful foliage and architectural trunks. The cocoanut palm is, perhaps, one of the most beautiful, and it is one of the most familiar, as in our semi-tropical States it is a naturalized tree, if not, possibly, an indigenous one. That and the cabbage palm and a small fan palm are the principal forms which grow in our North American States.

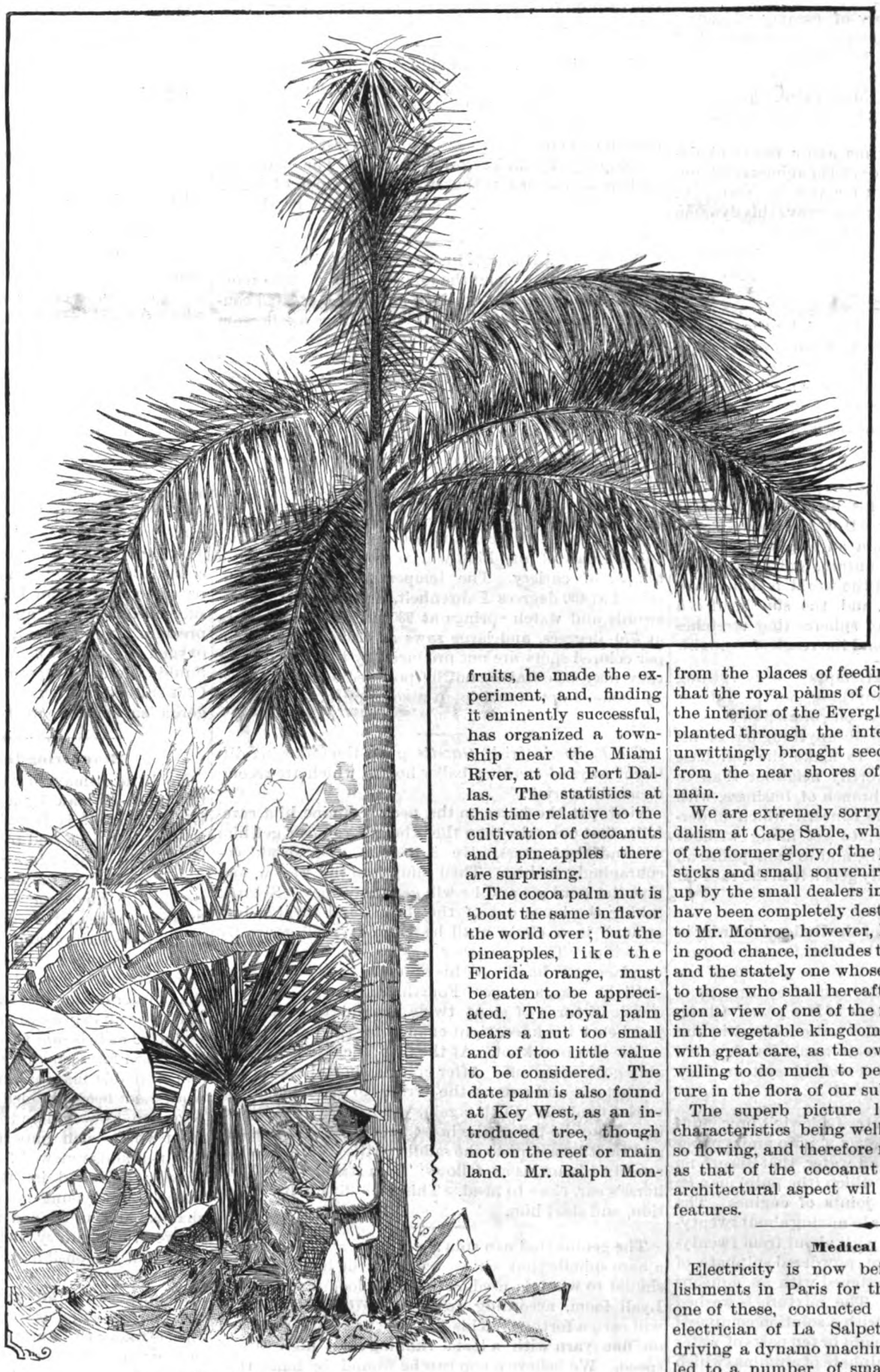
Palms, though found throughout the tropics, and a few even in the temperate regions of the world, are by no means generally present in the former. We may pass through great areas of forests and not meet one. They are, however, the most characteristic of tropical vegetation, and often abound in certain regions. On river banks they are especially conspicuous and abundant. They vary in height from a few feet to that of the most lofty trees. The latter are usually without stem or leaf, excepting upon the summit, where is a wide spreading crown of large pinnate leaves or fronds.

Palms of one hundred feet in height and a trunk two feet in diameter are not uncommon in the great mauritia of the Amazon. Humboldt even mentions one which he measured in South America as 192 feet in height.

The leaves are immense also. One of the manicaria palm measured thirty feet in length and nearly five in width; in this species having the additional singularity of being entire, and not pinnate or broken up into fine leaflets, as in the cocoanut palm. Some of the pinnate leafed are larger than the latter; those of the Maximiliana and Raphia being more than fifty feet in length.

Perhaps the fan palms are as pleasing as any. They certainly contribute remarkably to the picturesqueness of tropical forests, as they are usually quite low, and therefore complete the picture, which is otherwise made up by taller trees.

It is nearly thirty years since we visited the then almost untraveled region of southwestern Florida at Cape Sable. We had heard of the great beauty of the wild groups of royal palms at this place, and certainly the voyage well repaid the visit. We have never been able to determine how these trees originate at this latitude; but the finding of others subsequently on the reef seems to add more light on the subject, and rather suggests a solution of it.



THE ROYAL PALM.

In 1864 our government ordered a survey of the Florida reef, for the purpose of aiding the telegraph and cable company of Cuba. As one of the party of United States army officers who were detailed for the purpose, we utilized the excellent opportunities for noting facts in natural history. Among other circumstances which constantly surprised us was the discovery of such large trees and extended forests—a state scarcely to be expected on the low sandy islets, which have been built up from the ocean depths by coral agency, and which furnish a soil of very limited extent. Trees and shrubs which evidently were of more tropical origin were occasionally met with; but during the entire survey, which extended from Key West to Cape Florida, on the southwestern extremity of the State of Florida, we did not meet with a royal palm. The cocoanut palm was abundant. Yet at that time no considerable attempt had been made to make the fruit a regular article of commerce. A few years after this a vigorous attempt was organized to introduce the cocoanut and pineapple as regular articles of commerce.

Mr. Lum, of Red Bank, N. J., informed us, several years since, that on reading some published notes of ours relative to the results of the survey of the Florida reef and its suitableness for cultivation of tropical fruits, he made the experiment, and, finding it eminently successful, has organized a township near the Miami River, at old Fort Dallas. The statistics at this time relative to the cultivation of cocoanuts and pineapples there are surprising.

The cocoa palm nut is about the same in flavor the world over; but the pineapples, like the Florida orange, must be eaten to be appreciated. The royal palm bears a nut too small and of too little value to be considered. The date palm is also found at Key West, as an introduced tree, though not on the reef or main land. Mr. Ralph Monroe, of Staten Island, has for several years been accustomed to spend his winters at Fort Dallas vicinity, and latterly has purchased a tract near there as a pleasure ground for his exclusive keeping. He is a man of taste and lover of the wild and picturesque. It is peculiarly fitting, therefore, and it is fortunate for the preservation of the desirable, that he should have discovered the royal palm in groups upon his new land—a most unexpected circumstance.

It was thought, especially after our party had traversed the reef from end to end, that, save the small group at Cape Sable, the royal palm was not to be found north of Cuba.

Mr. Monroe was in the habit of taking with him into the forests of his new purchase a camera, with the necessary fixings. He came on one occasion, while pushing his way through the tangled underbrush beneath towering timber, where it is doubtful if any other white man ever had trod, natural habitat for the puma and tramping ground for the Seminole, upon a scene which both surprised and delighted him—a group of royal palms. What a gratification to the owner of this picturesque forest! and what a fortunate thing for Flora and her disciples, and for the lover of the picturesque! for Mr. Monroe will keep these trees as near as possible from all harm, and perpetuate their glories.

One extremely shapely one he has photographed, which is herewith presented. To do this he, with assistance, cut his way through a tangled forest by the use of the Cuban machette, and to get a good view it was necessary to cut a considerable swath distant for proper focus. Although the soil and climate along this latitude are well suited to such forms of vegetable life, yet it would seem probable that the royal palm, like many other trees and shrubs, has been through accidental circumstances planted there. It is well known that birds are a very common agent for such results.

Mr. Wallace, the eminent English naturalist, told us, in his late lecture in New York, how true it is that birds convey seeds in the mud or sticky earth which chances to remain on their feet, and eventually are conveyed hundreds of miles into the interior of newly visited lands. There are on the Florida reef many shrubs, as well as trees, both deciduous and others, which have evidently originated in like manner.

Birds also swallow fruits, the seeds of which are deposited, in the form of excrement, on lands far away from the places of feeding. It is probable, therefore, that the royal palms of Cape Sable, as well as those in the interior of the Everglade region, near Miami, were planted through the intervention of birds, who have unwittingly brought seeds from the Cuban forests or from the near shores of Yucatan and the Spanish main.

We are extremely sorry to record the results of a vandalism at Cape Sable, which leaves not one tree to tell of the former glory of the place. Such a call for walking sticks and small souvenirs from Florida has been kept up by the small dealers in north Florida, that the trees have been completely destroyed and removed. Thanks to Mr. Monroe, however, his purchase of a tract which, in good chance, includes the little group of royal palms and the stately one whose picture we here offer, secures to those who shall hereafter visit this now growing region a view of one of the most charming sights offered in the vegetable kingdom. These trees will be guarded with great care, as the owner is a man of taste, and is willing to do much to perpetuate such a pleasing feature in the flora of our sub-tropical country.

The superb picture leaves little to describe, its characteristics being well known. The foliage is not so flowing, and therefore not so graceful, in one sense, as that of the cocoanut palm, but its stateliness and architectural aspect will appeal to one as charming features.

Medical Electricity.

Electricity is now being employed at two establishments in Paris for the treatment of disease. In one of these, conducted by Dr. Vigoureux (the head electrician of La Salpetriere), there is a gas engine driving a dynamo machine, the current from which is led to a number of small electromotors. These are used to work electrostatic induction machines, which are of English make, and the electricity generated is applied to the patients sitting in insulated chairs. The advantage of induction machines over the old fashioned frictional machines is that they can work at a moment's notice, and in all states of the weather. A similar installation is in use at La Salpetriere.

122 Years Old.

Amy Avant, a colored woman on the plantation of Major James Reaves, in Marion County, S.C., died a few days ago, of measles, at the advanced age of 122 years. She was remarkably well preserved, and retained all her faculties up to the time of her fatal illness, previous to which she claimed that she had never taken a dose of medicine. During the last cotton picking season, she took her place regularly in the cotton fields and always performed a good day's work. Her age is well attested by family records.

Many Items of Interest.

The Columbus, Ga., *Enquirer-Sun* utters sound sense in the following, which is as pertinent to some of our Western States as to Alabama: "According to the reports which are daily sent out over the country, nearly every town in Alabama either has a boom or is about to get one. They are good things, properly managed, but nothing could be more disastrous than a too sudden advance in real estate prices. It is bound to bring reaction. The boom only too easily becomes a boomerang. There is only one safe course, and that is to first get your boom and then hold on to it. If it is inflated too much it will get away, and everything that has depended on it will drop."

A substance resembling ivory of creamy whiteness and great hardness is made from good potatoes washed in diluted sulphuric acid, then boiled in the same solution until they become solid and dense. They are then washed free from the acid and slowly dried. This ivory can be dyed and turned and made useful in many ways.

Charles Brush built some time ago a powerful dynamo for use in Cowles, Ala., for disengaging aluminum from clay so economically as to make the metal an article of commerce. A contemporary says this dynamo weighs 22,000 pounds, requires 500 horse power for its operation, and has an armature of 47 inches diameter, in the making of which 6,250 pounds of copper wire were used.

Man's insignificance is thus defined by the Boston *Journal of Commerce:* Somehow, when a man's mind becomes really engaged—say like that of Baron Humboldt—and he is able to place in focus more and more of the cosmos of which he forms a part, the things he at the outset of his life regards as the largest get smaller and smaller, till at last that first immense and overwhelmingly important thing, himself, becomes so insignificant that it is only through a process of mental microscopy he can discern his little float swim or wiggle across the field of view. How big is a man anyway? Well, he is smaller than an elephant, and an elephant is smaller than a mountain, and a mountain is smaller than the world, and the world is a mustard seed compared with the sun, and the sun itself is a mere mote in the dust cloud of spheres that stretches out through the universe beyond the reach of thought.

The individual or firm who attempts to do everything seldom succeeds in doing anything well. Life is not long enough to exhaust even one branch of science, art, or industry. When one needs anything out of his line of business, it is far better to make the purchase of an experienced and trustworthy neighbor than to undertake to learn another branch of business, with all its cost of experience. The concern which undertakes to make all the money, to get along without making any purchases of others, and to monopolize all the avenues for profit, generally gets left in the race for wealth.

They seem to have builders of the Budensiek order in London as well as in New York. The *Building News* said the other day that the true cause of much of the present stagnation of business is caused by the appalling amount of bad building done of late years. Cheap and nasty architecture ruins the national health, and if the next conference of architects would but devote a little attention to the rotten leasehold system, they would be doing a great public good.

L'Industrie Moderne gives Mr. Ladewig's process of manufacturing from asbestos fiber a pulp and a paper that resist the action of fire and water, that absorb no moisture, and the former of which (the pulp) may be used as a stuffing and for the joints of engines. The process of manufacture consists in mixing about twenty-five per cent of asbestos fiber with about from twenty-five to thirty-five per cent of powdered sulphate of alumina. This mixture is moistened with an aqueous solution of chloride of zinc. The mixture is washed with water and then treated with a solution composed of one part of resin soap and eight or ten parts of water mixed with an equal bulk of sulphate of alumina, which should be as pure as possible. The mixture thus obtained should have a slightly pulpy consistency. Finally, there is added to it thirty-five per cent of powdered asbestos and five to eight per cent of white barytes. This pulp is treated with water in an ordinary paper machine and worked just like paper pulp. In order to manufacture from it a solid cardboard, proof against fire and water, and capable of serving as a roofing material for light structures, sheets of common cardboard, tarred or otherwise prepared, are covered with the pulp. The application is made in a paper machine, the pulp being allowed to flow over the cardboard.

In an interesting article on cream, its value and use, Professor Arnold, of Cornell University, says: The superiority of cream over butter or any other solid fat consists, first, in its being not exactly in a liquid form, but in a condition allowing of great mobility between its particles, permitting the gastric juice to mix with it in the most perfect manner, and with whatever else the stomach contains, thereby aiding digestion. Its behavior is quite different in this respect from that of butter and other pure fats. As soon as they become melted they grease over the other contents of the stomach, obstructing, in a measure, the contact of gastric juice, and hindering, rather than hastening, the progress of their digestion.

The New York Electrical Society are to make a grand display at the American Institute exhibition next autumn. The exhibition will include all that is newest, and a special and interesting feature will be the storage of electricity and its application to the transmission of power. This promises to be the best electrical exhibition ever held in this country.

The most successful individuals and firms are those which have developed a promising specialty, leaving collateral matters to the attention of their neighbors in trade and industry. The possibilites of any one branch of manufacture grow upon investigation, and develop rapidly under fostering care. The man who gathers all the profits that are in one branch of legitimate industry can well afford to give his brother in trade a chance as well.

The Natural History Museum had a spring opening, which took place about the middle of May. The most noted among the new exhibits, and which created considerable attention on the opening day, was a collection of birds, consisting of eighteen groups, each representing a pair of birds—with their nests and the eggs or young—of the different varieties found within fifty miles of New York. It is the first collection of its kind in this country, and has been prepared by the munificence of Mrs. Mary Stuart, whose husband, the late Robert L. Stuart, was one of the founders, and for a number of years president, of the museum association.

A temperature of 570 degrees will produce a dark blue color on polished steel, and 590 degrees a pale blue. Oil or grease of any kind will answer for drawing the temper of cutlery. The temper for lancets is obtained at 430 degrees Fahrenheit, axes at 500 degrees, swords and watch springs at 530 degrees, small saws at 570 degrees, and large saws at 590 degrees. Copper colored spots are not produced by tempering; but they may be obtained on the polished surface of steel by immersing the article in a solution of sulphate of copper.

The Farmer's (Irish) *Gazette* gives the following different ways of treating balky horses, which are recommended for trial:

First, pat the horse on the neck, examine him carefully, first one side, then the other; if you can get him a handful of grass, give it to him, and speak encouragingly to him. Then jump into the wagon, and give the word go, and he will generally obey. Second, taking the horse out of the shafts, and turning him around in a circle until he is giddy, will generally start him. Third, another way to cure a balky horse is, place your hand over his nose and shut off his wind until he wants to go. Fourth, then, again, take a couple of turns of stout twine around the fore legs, just below the knee, tight enough for the horse to feel it; tie in a bow knot. At the first click he will probably go dancing off. After going a short distance you can get out and remove the string, to prevent injury to the tendons. Fifth, again, you can try the following: Take the tail of the horse between the hind legs, and tie it by a cord to the saddle girth. Sixth, the last remedy I know, is as follows: Tie a string around the horse's ear, close to head. This will divert his attention, and start him.

The genius that can spin a cotton or a woolen cop on a bare spindle that will weave from the inside, that is, similar to what is used on a carpet loom and on the Lyall loom, according to *Wade's Fibre and Fabric*, will earn a fortune. This has not been accomplished on fine yarn with a loom running at a high rate of speed. We believe a cop can be wound by hand that will weave in this way. It requires a rapid vibration while winding on to prevent the yarn from sloughing off in a tangled mass when weaving. With this fact before us, it would seem that some genius ought to be able to produce the motions that will produce the cop wanted.

A new process of annealing wire consists in coiling the wire upon a hollow metallic core or drum, embedding the wire and core in sand or its equivalent, surrounding a central open space, subjecting the whole to heat with the wire thus embedded, and then allowing the whole to cool before removing the wire from the embedding material. While cooling, the vessel is dipped intermittently into cooling liquid.

According to the *English Mechanic*, a very good way to anneal a small piece of tool steel is to heat it up in a forge as slowly as possible, and then take two fireboards and lay the hot steel between them and screw them up in a vise. As the steel is hot, it sinks into the pieces of wood, and is firmly embedded in an almost air-tight charcoal bed, and, when taken out cold, will be found to be nice and soft. To repeat this will make it as soft as could be wished.

Geo. E. Doering, Ph.D., informs one of our medical journals that an alcoholic solution of oil of wintergreen rubbed on the marble slab of a soda fountain will keep the flies away and not prove disagreeable to customers. It is well known that all essential oils are poisonous to insects.

To make a good black varnish for ironwork, take 8 pounds of asphaltum and fuse it in an iron kettle, then add 2 gallons of boiled linseed oil, 1 pound of litharge, ½ pound of sulphate of zinc (add these slowly or it will fume over), and boil them for about three hours. Then add 1½ pounds of dark gum amber and boil for two hours longer, or until the mass will become quite thick when cool. After this it should be thinned with turpentine to the proper consistency.

Ozone.

Ozone, according to the recent careful observations of Dr. Olszewski, boils at a temperature of —106° C. This curious substance—the nature of which was so long a mystery, and about which so many conflicting hypotheses have been devised—is now becoming well known to us. For the sake of those of our readers who have not been able to follow the details of recent research, we may in a few words summarize the present state of our knowledge. Ozone is a denser form of oxygen. Its specific gravity is 24, that of common oxygen being 16, and that of hydrogen 1. It is highly probable that its molecules contain three similar oxygen atoms. In the concentrated state it is a powerful irritant poison, and it is very unstable, decomposing with explosion and with evolution of heat, and exerting a most powerful action on oxidizable materials. For some time past it has been known that it liquefies under the influence of combined cold and pressure. The liquid is indigo blue, and its vapor in a tolerably concentrated state has a color which can only be compared to that of an Italian sky. Olszewski has now succeeded in liquefying it at the ordinary atmospheric pressure by exposing it to the intense cold of boiling oxygen (—181° C.). When cautiously heated the liquid began to evaporate, and when heated to —106° C. it entered into active ebullition. It is a very dangerous substance to work with.—*Lancet.*

Blundering in the Naval Bureau.

No little dismay has been occasioned in the Naval Ordnance Bureau by a mishap which, apparently trivial in itself, is fraught with grave consequences. A great injury is said to have been done to one of the largest pieces of ordnance yet attempted at the Washington ordnance factory, by the breaking of a portion of the huge bar which carries the tool used to finish the bore of the gun. The accident is said to be of a serious nature, and the present prospect seems to be that the piece is injured beyond repair. A deep score is said to have been cut in the interior surface of the powder chamber. In any case, the accident bids fair to be an expensive one. This is the more to be regretted as it is said to have been a thing which could have been foreseen and guarded against if the delicate and valuable manipulations called for in this class of work had been confided to the care of competent supervision, as would be the case in a private establishment where such important interests were at stake. And this adds renewed force to the criticism which has already appeared in these columns of the system which places young men unskilled in any of the mechanical arts, untrained in shop service, and ignorant of even rudimentary metallurgy, in positions of high trust and responsibility in a factory of ordnance of the grade which the Government aspires to set up at Washington. In all this it must be borne in mind that no reflection is expressed or intended upon the officers under the Bureau of Ordnance when operating in their proper spheres and carrying on the legitimate duties of their profession. The country is too much indebted to the fighting branch of the navy to render effective any criticism of their ability in any and all positions for which they are fitted by their education and training; but it is unreasonable to expect full and unbroken success in the career of any man, be he officer or otherwise, who aspires to be "Jack-at-all-trades." Without long and persistent training in mechanical pursuits, any success which may attend the sudden investment of a naval officer with the superintendency of a great gun shop, such as the one at the capital, will be due more to "good hit than any good wit."—*Army and Navy Journal.*

ON Decoration day, the Manhattan Elevated Railway, New York, carried 571,412 passengers, or 14,000 more than ever before in one day, and the receipts were $28,570. The average daily passengers for the three months ending March 31 were nearly 430,000, including Sundays.

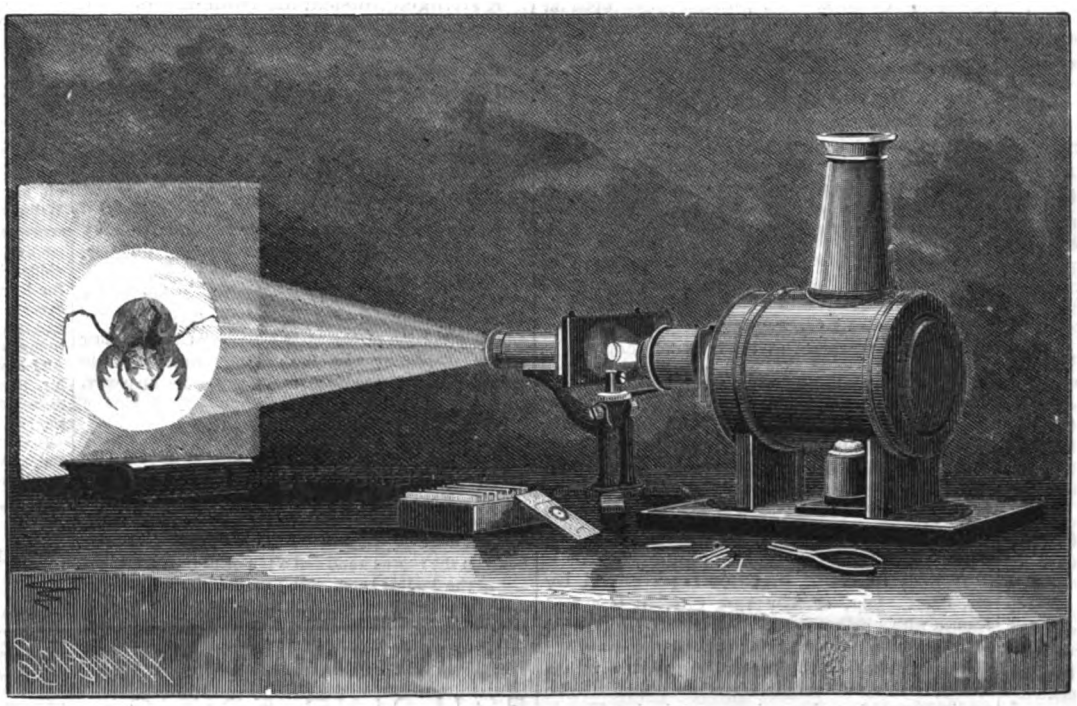
SCIENCE IN TOYS.

XI.

MICROSCOPIC PROJECTION.

In mechanics it is a generally accepted principle that a tool or a piece of apparatus applicable to a large number of uses is too much like the Jack of all trades; but this principle is hardly applica*ble to* physical apparatus, as it is seldom in continual use. In *fact*, it seems desirable to find as many uses as possible for the different pieces of physical appa*ratus* one possesses, and this remark applies to scientific toys *quite* as appropriately as to the more expensive apparatus.

In the case now presented, the toy lantern and the toy microscope described in previous articles are pressed into the service of microscopic projection, the lantern serving as the illuminator, the microscope stand as a support for the object, and the eyepiece of the microscope as a projecting objective.



MICROSCOPIC PROJECTION.

To arrange the microscope for projection, the focusing tube is withdrawn from its guide, the draw tube is removed from the focusing tube and inserted in the place of the latter, after being wrapped with one or two thicknesses of paper to make it fit. The eyepiece is now inserted bottom up in the draw tube, that is, with the eye lens next the stage of the microscope. The tube is then turned down into a horizontal position, as shown in the engraving, an object of some kind is placed on the stage, and the lantern is arranged so as to project a bright, sharp image of the flame upon the back of the object. The illuminating power of the lamp may be increased by turning its flame edgewise or at angle of 45°, and (as suggested in the article on the toy lantern) the addition of a small piece of gum camphor to the oil in the lamp intensifies the light.

A screen, preferably of white cardboard, is placed about five feet distant from the microscope, and the image is focused by sliding the draw tube. It will, of course, be understood that the room in which the microscope is used must be made as dark as possible. With these appliances, ordinary objects may be projected so as to be easily visible to twelve or fifteen persons. The nearer the screen is to the microscope, the brighter will be the image.

The eyepiece belonging to this microscope is of the negative kind, that is, the image is formed between the eye lens and the field lens, when the eyepiece is used in the regular way. Very good results may be secured by the use of a single lens. Either of the lenses of the eyepiece may be used by removing the other, but in this case the diaphragm must be taken out to allow the full beam of light to pass.

The objects that may be shown in this way are the larger animalcules found in stagnant water, parts of insects, sections of wood, stems, leaves, etc., crystals, woven fabrics, feathers, etc. The objects selected should be as thin as possible, and if unmounted should be pressed flat between two glasses. An inexpensive cell for containing objects in water may be made by pressing two plates of glass, one inch wide and three inches long, upon opposite sides of one or two segments of a rubber fruit jar ring, and binding the glasses together upon the rubber by means of very strong thread.

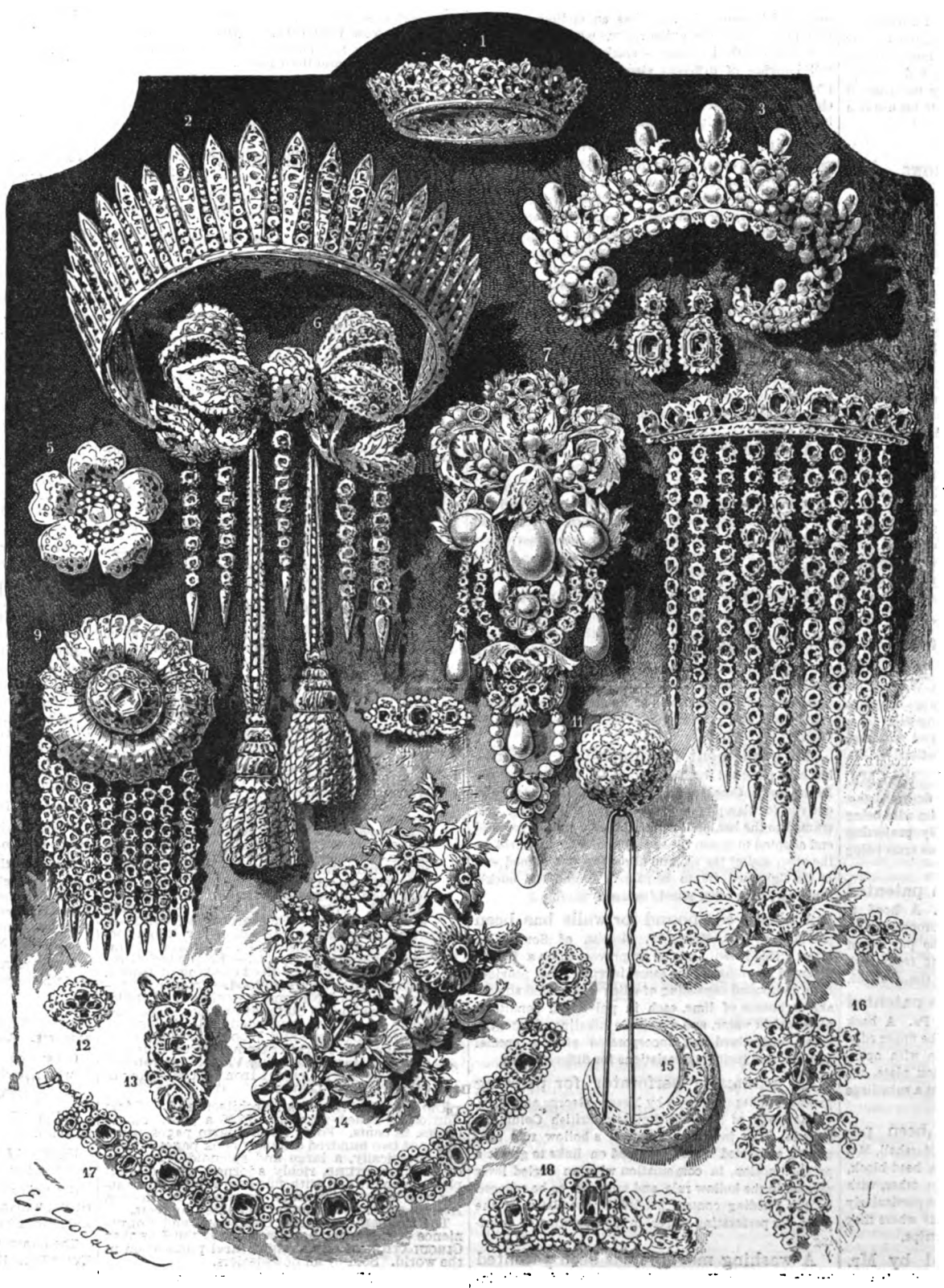
Some care is necessary in placing the microscope tube and lantern tube axially in line. It is necessary to support the microscope at such a height as to cause the brightest part of the image of the flame to fall upon the object. A clear, sharp image may be produced in the manner described, but, of course, its size is limited by amount of light available. With a strong light, such as is used in larger lanterns, the size of the image may be greatly increased. G. M. H.

Fasting and Poisons.

The advance of rational therapeutics will be characterized by increased precision in instructions as to the mode of taking medicaments, their relation to food, their state of dilution, difference of action according to temperament, and so forth. Fasting is already known to exercise an important influence on the effect of certain substances, and M. Roger has further investigated the influence of the state of hunger upon the power of animals to resist the poisonous action of alkaloids. It was found that such alkaloids as quinine, atropine, or nicotine were only four-fifths as toxic if introduced during fasting into the peripheral venous system of a rabbit as compared with their action when introduced while digestion is in progress. But if introduced into the portal venous system during digestion, the toxicity is only half that during fasting. It is assumed, then, that fasting diminishes the power of the liver to arrest the alkaloid, and this coincides with a diminished power of glycogen formation. Sugar given to the animal three hours before experimentation causes the liver to recover its functions. —*Lancet.*

THE CROWN JEWELS.

The sale by auction of a vast number of jewels is a matter of no mean importance, especially so when they are the imperial jewels of no less a country than France. The jewels themselves were of rare worth, owing to their size, purity, and beauty, and their value being many times enhanced by their historical associations. In spite of the meager details that have reached here concerning the sale of the 12th of May and following days, the interest taken in the event has been marked; and although the illustration, which is borrowed from the French paper *L'Illustration*, is as perfect as could have been expected, it can only convey a feeble idea of the beauty of some of the choice gems. Nos. 1, 12, and 13 are a small crown, and pendants of rubies and diamonds. No. 2 is known as the Russian crown. No. 3 the grand pearl crown. Nos. 4, 10, 18, pendants and pins of sapphires and diamonds. No. 17 is a necklace of the same stones. No. 5 a rose. No. 6 a knot with two tassels. No. 7 a brooch with pearls and diamonds. No. 8 a comb with large diamonds. No. 9 a buckle for a belt. No. 11 a rosette for the hair. No. 14 a bouquet to be worn on the corsage. No. 15 a crescent. No. 16 the brooch Sevigne.



THE CROWN JEWELS OF FRANCE, RECENTLY SOLD AT AUCTION IN PARIS.

Many of the jewels sold will be brought to America, several purchasers from this country being represented at the sale. Messrs. Tiffany & Co., of New York, the well known jewelers, purchased a necklace for 183,000 francs. It consisted of four revieres made up of 222 diamonds, weighing 363 carats.

A FORGE hammer has been invented in England which is driven by gas instead of steam.

ENGINEERING INVENTIONS.

A car bell has been patented by Mr. William H. Hudson, of New York City. It is adapted to be operated from the axle of the car when the latter is in motion, the car bell and striker being arranged in connection with a pulley having an arm operating on the striker, an endless belt passing over the pulley and operated by the axle of the car.

A steam heater for railway cars has been patented by Mr. Henry R. Robbins, of Baltimore, Md. This invention covers certain novel features of construction in steam heaters in which pipes or tubes are supported underneath a train of cars, with means for communicating with registers or other devices for diffusing the heat within the cars.

A car coupling has been patented by Mr. Lavvega Self, of Piedmont, Mo. Combined with the chambered head of the drawbar is a spring-pressed follower adapted to hold the pin in an elevated position, and to hold the link in suitable position for engagement with the drawhead of the adjacent car, the device being simple and designed to work entirely automatically.

An automatic railroad gate has been patented by Mr. John T. Phillips, of New Castle, Pa. It is designed to be closed automatically by the approaching train and opened as soon as the last car has passed the gate, which is pivoted, in connection with springs arranged at the side of one of the rails of the track, wheels mounted in bearings, levers engaging the springs and wheels, and other novel features.

A tube expander has been patented by Mr. Thomas Beverly, of Ellis, Kansas. It is especially designed for expanding the ends of boiler tubes close up to the flange of the flue sheet, a single tool being provided for flues of different diameters, the stock being adapted to receive rollers or swages of different sizes, in connection with which is employed a tapering plug varied in size and form for different requirements.

A car coupling has been patented by Mr. Henry Gallager, of Savannah, Ga. It is intended especially for use on freight cars, having a drawhead of the ordinary form, with pin openings, with a main lever and a pin suspended at its forward end, the rear end being pivoted to the drawhead, the device being intended as a simple construction, whereby the coupling and uncoupling can be effected without trainmen going between cars.

A railway gate has been patented by Mr. Oliver H. P. Cornell, of Albany, N. Y. It is for closing highways at the intersection of railways and for giving an alarm just before and during the closing of the gates, and has a spring-actuated mechanism, a scape wheel and a pendulum pivoted on a fixed support, with other novel features governing the time of opening and closing and adapting the gate for use in a variety of situations.

AGRICULTURAL INVENTIONS.

A combined hay rake and tedder has been patented by Mr. Cassius M. Maxson, of Portville, N. Y. This invention covers various novel details in the construction and combination of parts of a machine which can be readily adjusted for use as rakes or as tedders, and which is calculated to be reliable in operation in either capacity.

A dust conveyer for thrashers has been patented by Mr. Lyman A. Miller, of Carbondale, Ill. Combined with the thrashing cylinder and feed board are a fan and fan case, with a tube having its vertical portion provided with inwardly or rearwardly projecting tubes, extended to conform to the lower side of the feed board and then carried upward and rearward to cause it to overhang the feed board.

A combined seeder and fertilizer distributer has been patented by Mr. Isaac N. Franklin, of Lake View, Chicago, Ill. The construction is such that the seed and fertilizer are simultaneously dropped in one spot on one side of the machine into a furrow made by the opening cutter or plow, the furrow afterward being closed by the driving wheel, the invention covering various novel details and combinations of parts.

MISCELLANEOUS INVENTIONS.

An improvement in calipers forms the subject of a patent issued to Mr. Oliver D. Warfield, of Chicopee Falls, Mass. The invention consists in a joint formed of two rolling surfaces held together by a spring, the legs having convex surfaces and mortises, and the spring having tenons to fit the mortises.

A hat has been patented by Mr. Robert Plate, of New York City. It is designed as a cheap and practical folding hat, the brim wire being formed in curved sections, with inwardly projecting radial arms at the ends of each section, the arms being held by radial seams in the brim.

A fireplace blower has been patented by Mr. Ralph Ely, of Delaware, Ohio. A hood is secured to the lower edge of the blower proper, and so arranged as to permit free access for the purpose of stirring the fire, while the dust resulting from such stirring will be carried up the chimney by the draught.

A necktie fastening has been patented by Mr. James H. Carter, of Philadelphia, Pa. A back plate is connected at its upper edge to the upper edge of the front or main portion of the necktie, with openings through the front portion and back plate, the button head holding the tie also serving as a substitute for the ordinary scarf pin.

A scribing attachment has been patented by Mr. William F. Seargeant, of Marshall, Mo. It consists of two parallel legs united by a head block, one leg being somewhat longer than the other, with other features, the attachment being more particularly designed for marking off weather boards where they abut against window casings and corner stripe.

A swing has been patented by Mr. John O. Lyon, of Quincy, Ill. Its construction is such that no rope or other connection with a fixed point is required to operate the swing. The seat may be adjusted to an upright or a reclining position. The swing is easily portable, and has an awning to adapt it for comfortable use in sun or shade.

A hat hook has been patented by Messrs. Gustav and Frederick Pape, of New York City. This invention covers a pivoted arm arranged to be closed upon a hat or other garment placed upon the hook, and to be locked to prevent the removal of the garment except by the person holding the key to unlock the pivoted arm.

A cattle stanchion has been patented by Mr. Dwight Manwaring, of Algona, Iowa. The frame has a horizontal rod on its top cross piece, the neck bars having separate independent flexible connections at their upper ends sliding laterally on the horizontal rod, the neck bars being thus yieldingly mounted and increasing the comfort of the animal.

A necktie has been patented by Mr. John H. Irwin, of Philadelphia, Pa. Combined with a binding strip formed with button holes are studs fitted within the button holes, the binding strip being composed of several layers of the material forming the outer face of the scarf, thus making a scarf which can be worn much longer than the ordinary form.

A bustle has been patented by Messrs. Edward D. and John Fraser, of Brooklyn, N. Y. It consists of main and auxiliary loops so arranged that when the extending loops are subjected to any pressure directed toward the person of the wearer the loops will fold upward and inward to positions within the line of the main supporting hoop.

A cuff fastener has been patented by Mr. David Stone, of New York City. It is a stud formed with a hollow shank adapted to receive a headed pin, the head of the stud being preferably concave and the hollow shank being preferably provided with a spring, making a fastener whereby the cuff may be readily secured in such position as may be desired.

A carpet stretcher has been patented by Mr. Oscar L. Sprague, of Andover, Ohio. Combined with a slotted main frame is a rack bar carrying teeth and having vertical and longitudinal movement, a pivoted lever carrying a pawl, an independently pivoted retaining pawl, and other novel features, calculated to make a simple and effective device for the work of putting down carpets.

A cigar bunching machine has been patented by Messrs. William M. Steinle and Anton Senn, of Toledo, Ohio. It has an endless traveling apron and adjustable guide roller, whereby either or both edges of the belt may be slackened or tightened to roll bunches of different sizes and shapes, the compressor cutting off surplus tobacco as it descends on the cigar bunch placed in the shaper and forcing the bunch into the mould cavity without too much pressure.

An improvement in pants has been patented by Messrs. Frank Kahn, Hirsch Morris, and Louis Morris, of Memphis, Tenn. It consists in having a strip stitched at opposite sides of the crotch seam, through the laps or folds, with a second separate strip crossing the first strip and stitched to the legs at opposite sides of the seams, the invention relating especially to working pants or overalls, and being intended to make ripping practically impossible.

A fruit picker has been patented by Mr. George C. Thompson, of Darien, Ga. It consists of two pivoted hemispherical cups, arranged to nest together or pass one into the other, combined with a pull cord for closing them to a spherical form, and a forked handle, permitting fruit to be picked from clusters, from the picker not expanding to occupy a great space when opened.

A washing machine has been patented by Mr. John W. Neff, of Buckhannon, West Va. Combined with a suds box in which revolves a drum, having circular plates with circularly arranged bowed springs, the plates carrying concave rubbing sections connected by bolts to the ends of the springs, are other novel features, to bring more or less pressure on the clothes in their passage between the drum and rubbing sections.

A shuttle operating mechanism has been patented by Mr. Lynn W. Buck, of Springfield, Vt. The sweep stick is formed with a slot through which the picker stick passes, the slot being larger than the picker stick, to permit independent movement of the latter, the sweep stick being supported and connected with the picker stick by an all wood or all metal connection, and yet retaining freedom of action or rebound.

An implement for buckling bale ties has been patented by Mr. Frederic S. Williams, of De Roche, Ark. Combined with a bar having a device at one end for clamping one end of the tie is a lever fulcrumed to the bar, and formed with a forked forward end adapted to retain the cross bar of a buckle held to the other end of the tie, and allow the first named end of the tightened tie to be passed around the buckle cross bar, with other novel features.

A plastic compound for walls has been patented by Mr. Henry W. Merritt, of Somerville, Mass. This invention is an improvement on a former patented invention of the same inventor, and provides for a compound consisting of silica and a solid silicate and carbonate of lime, each in pulverized condition, dissolved in water, and a soluble alkaline silicate, the whole intermixed and incorporated after a special manner, and including variations for different uses.

An automatic perforator for printing presses has been patented by Messrs. George and Robert Kennedy, of New Westminster, British Columbia, Canada. The invention provides a hollow rule containing a serrated cutter mounted on links to give it a parallel motion, in combination with an angled lever pivoted in the hollow rule and arranged to be engaged by the yielding contact carried by the platen of the press, for perforating paper in the operation of printing.

A washing machine has been patented by Mr. Townson Hand, of Shelbyville, Ind. This invention provides an improvement in machines where conical shaped dashers are made to reciprocate vertically in a tub on a revolving table, the machine being adjustable by a single tension screw to operate on a large or small number of clothes, and provides means whereby the dashers may be readily changed from a vertical to a horizontal position, with other novel features.

A stringed musical instrument has been patented by Mr. George W. Van Dusen, of Brooklyn, N. Y. This invention relates more particularly to pianos, providing a simple arrangement of the strings and their supports, the spring wire being flattened where it is doubled over or around a head or pin, and the string head having a knife edge bearing upon a compensating lever, the construction being designed to assure the maintenance of the strings in practically perfect harmony and pitch of tone.

A carding engine has been patented by Messrs. Benjamin A. Dobson and William I. Bromiley, of Bolton, Lancaster County, Eng. The invention relates to an improved arrangement for casing in the space between the cover of the doffer cylinder and the adjacent portion of the main cylinder of the carding engine, dispensing with the ordinary wooden or tin mould or any other loose filling up or making up pieces, the use of which necessitates separate adjustments of the parts.

A carding engine has likewise been patented by Mr. William Dobson, of Bolton, Lancaster County, Eng. In connection with the engine bend, flexible bend moving lengthwise, and cams and pins for adjusting the flexible bend, are a slotted bracket piece on the engine bend and a pin or projection on the end of the flexible bend riding in the slot, making an easily arranged positive adjusting action.

Notes & Queries

HINTS TO CORRESPONDENTS.

Names and Address must accompany all letters, or no attention will be paid thereto. This is for our information, and not for publication.

References to former articles or answers should give date of paper and page or number of question.

Inquiries not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all, either by letter or in this department, each must take his turn.

Special Written Information on matters of personal rather than general interest cannot be expected without remuneration.

Scientific American Supplements referred to may be had at the office. Price 10 cents each.

Books referred to promptly supplied on receipt of price.

Minerals sent for examination should be distinctly marked or labeled.

(1) W. W. Q. writes: I have two baths which I have been using for plating; one is of cyanide of silver and the other of cyanide of gold; how can I reduce these baths so as to obtain metallic silver and gold? A. Precipitate with zinc clippings and sulphuric acid, and dissolve out the excess of zinc with more sulphuric acid. Do not work at it in a closed room, as poisonous gas may be evolved.

(2) S. M. M. desires a recipe for preserving rose leaves, as we see them in jars in art stores. A. Put a handful of salt on the bottom of an earthen jar, then a layer of leaves, and repeat this alternately until the jar is filled. Keep the jar as much as possible in a cool place, and covered over when the leaves are not to be exposed.

(3) A. F. asks: 1. Will paper varnished with common furniture varnish be good material for use in an induction coil? A. Shellac is generally used, and will save time in drying. The other will answer, but may need baking after each application. 2. I have a small magneto-electric machine, such as is used in ringing telephone bells; will it work a small induction coil, and what kind of a current does it produce, no commutator being used? A. It will work a small induction coil, giving the usual "shuttle" current. 3. I have a large number of small spools wound with No. 36 silk-covered wire, each spool containing about 1¼ ounces of wire; can I use the wire for making an induction coil, and if so, how should the spools be connected and how should the layers be insulated? A. You can use the wire, but must rewind it. See SUPPLEMENT, Nos. 160 and 166, for full instructions.

(4) J. M. G. asks: 1. Can you give me a receipt for starching India paper? A. See article on "India Paper," page 149, SCIENTIFIC AMERICAN for March 5, 1887, for this information. 2. Can you tell me how to burn or boil linseed oil? A. Linseed oil in the proportion of 1 gallon with ¾ pound litharge is allowed to simmer with frequent stirring until a skin begins to form, which scum is then removed, and when the oil has become cold and settled, the clear portion is decanted and called boiled oil. 3. What effect has sugar of lead on printing inks? A. If combined with the linseed oil, it would tend to make a quick-drying ink.

(5) T. H. K. writes: In tinning copper vessels, I have them scoured out with sand after they have been in sulphuric acid water a day or so, and when I come to tinning, use a forge heat, and tin with pure block tin and sal ammoniac, but the tinning will not adhere to the copper on some parts. A. A forge blast is very uncertain, and apt to overheat spots before the tin takes. A charcoal furnace is better. You should be able to tin vessels or kettles with powdered resin sprinkled on the surface, by pouring on the melted tin, having it quite hot, and allowing the surplus to run off at once back into the melting pot. A little powdered sal ammoniac will help the flow if it becomes lumpy. Brushing the clean surface of the copper with a saturated solution of zinc and sal ammoniac in hydrochloric acid (tinman's acid) should also work well, pouring the hot tin quickly. We fear that your whole trouble comes from the treacherous forge fire.

(6) J. E. S. asks the best explanation of the fact that the moon appears larger when near the horizon than when high in the heavens. A. The atmosphere by its refraction acts as a lens, producing an apparent increase in diameter near the horizon. Some claim that it is only an optical illusion; yet, when we consider that the atmosphere as seen from the surface of the globe is a section of a vast lens whose radius is the semi-diameter of the earth, it is reasonable to assume a small increase in the size of objects seen through it, and a still greater increase when seen in the obliquity of the horizon, in the same manner as an object is seen at a low angle through a long focus lens, or by turning it edgewise.

(7) A. S. E. asks (1) how to clean Quincy granite when rusty, after being exposed to the weather a few years. A. Use strong lye, or make a hot solution of 3 pounds of common washing soda dissolved in a gallon of water. Lay it on the granite with a paint brush. 2. What is the cause of Italian marble having a greasy appearance after being in the weather a few years? A. The discoloration is due to the gases in the air, and the marble can be cleaned similarly to the method as above given.

(8) G. R. R. asks how to restore the luster of morocco leather, such as is used for blinds and saddles in harness. A. It is probably patent or japanned leather on your harness, instead of morocco; such luster is put on by baking on a special black varnish in an oven. A paste suitable to preserve gloss of patent leather and prevent cracking is made of wax with a little olive oil, lard, and oil of turpentine, mixed when warm, to be of the consistency of thick paste when cooled.

(9) J. E. writes: I have a large ash heap which I wish to use for walks around the house. Can you tell me what to mix with it to make a cheap and durable walk? A. Mix ordinary clay with your ashes, and it will make a good walk. 2. Also how to clean a marble slab that has become discolored from use? A. Take 2 parts of common soda, 1 part of pumice stone, and 1 part of finely powdered chalk; sift it through a fine sieve and mix it with water; then rub it well all over the marble, washing with soap and water.

(10) E. G. G. desires some method of wholly or partially decolorizing vinegar. A. Filter it through charcoal or add a handful of charcoal to a barrel containing it. Agitate thoroughly and then filter.

(11) J. E. A. asks: What will clean a white Derby hat? A. Wash in a hot solution of carbonate of soda or sesquicarbonate of ammonia; but it is difficult for even an expert to clean such stock without destroying the original finish.

(12) R. B. W.—For plain directions for making a simple telephone, see SUPPLEMENT, No. 142; for making colored fires see details in SUPPLEMENT, Nos. 49 and 317.

(13) C. H. desires a receipt or preparation to clean and polish knives, forks, and tinware. A. Rub with equal portions of fine coal ashes and soda, with a little water.

(14) W. B. H. says: Will you please give me the height of printer's type as usually made, in thousandths of an inch. A. $\frac{918}{1000}$ of an inch.

(15) J. M. D. asks: 1. What will be the result if I introduce a small amount of compressed air into boilers supplying steam to run compressor? A. Air and steam combined for motive force is an old idea, which has been tried and has failed; it costs more to introduce the air than its value. It will do no harm and little good. 2. What is the best lubricant for cylinders of engines driven by compressed air? A. Use light mineral oil. 3. What is meant by "clearance space" in cylinder? A. Clearance is the space between the cylinder head and the piston at the commencement of the stroke, and the steam passage between the valve and cylinder.

(16) W. H. S. asks for something, in liquid or any other form, good for purifying air in laboratory where acids and gases exist. A. We know of nothing but ventilation. The odors you wish to overcome are presumably stronger than anything you could use to neutralize them.

(17) C. E. B. asks: What material is used in taking a mould of one's head and shoulders, preparatory to making bust of plaster of Paris or clay? Also, how can one prepare or cover the hairy portions of the head and face? A. The person must lie on his back, his hair being tied behind; into each nostril put a conical piece of paper, open at each end, to allow of breathing. The face is to be lightly oiled over, and the plaster being properly prepared is to be poured over the face, taking particular care that the eyes are shut, till the plaster is a quarter of an inch thick. In this way a mould is to be formed from which a second cast is to be taken, that will furnish a cast exactly like the original. How such work can be done by those who are inexpert is described in the SCIENTIFIC AMERICAN of November 27, 1886.

(18) J. C. G.—Galvanized pipe for water for house supply is not poisonous if the water be kept running constantly. If the pipe is closed for a night, the water that the pipe contains should be drawn off before any water is used in the morning. The black pipe gives rusty water, and if of small diameter, soon stops up with rust nodules.

(19) A. L. P. asks what to use to paint cast iron vases with, white, that will stand the weather. A. White japan varnish baked on the vase in an oven or drying room at a temperature of 225° is the only white that will stand the weather. All air-drying paints weather.

(20) W. S. C. asks how to make black stencil blacking which is sold in cakes. A. Triturate together 1 part pure soot and 2 parts Prussian blue with a little glycerine, then add 8 parts gum arabic and sufficient glycerine to make the desired consistency.

(21) G. A. writes: We have an island on which poison ivy grows. What is the best means to exterminate it, and what is the antidote for ivy poisoning? A. The vines can only be removed by digging them up or burning them away. They cannot be destroyed except with other vegetation through fire and similar means. As an antidote, bathe the parts affected with a tablespoonful of sulphate of copper dissolved in a small teacupful of boiling water.

(22) W. S. asks (1) a recipe for a candy called butter scotch. A. Take 1 pound of sugar, ¾ pint of water, and set over a slow fire; when done, add 1½ tablespoonfuls of butter, and lemon juice to flavor. 2. What is the best paste, homemade? A. See recipe given in SCIENTIFIC AMERICAN SUPPLEMENT, No. 159. 3. How is ginger ale made? A. See article on "Summer Beverages," given in SCIENTIFIC AMERICAN SUPPLEMENT, No. 270.

(23) J. E. P., Jr., asks a receipt for overcoming the odor of corduroy. A. We doubt there being any practical remedy, except the equivocal one of substituting some other more powerful odor. There are kinds of corduroy which do not have much odor.

(24) A. C. D. asks how to make a filter for oil that has been used once in dynamo oil cups. This oil accumulates, and is not very dirty. A. Filtering through cotton or cotton waste is the simplest manner of purifying the oil, if it is not very dirty. When a more thorough filtering is needed, heat the oil with an equal quantity of water to 212° Fah., agitate for a short time, and allow it to cool before decanting.

(25) A. B. C. desires a recipe for making first class sticky fly paper. A. In a tin vessel melt together 1 pound of resin and add 2 fluid drachms of linseed oil; while the mixture is warm, dip a spatula into it, and spread what adheres to the blade on foolscap paper. Different samples of resin require varying proportions of oil to make the mixture spread properly.

(26) A. C. B. asks about painting posts with a mixture of boiled oil and pulverized coal. What kind of coal is used, and the best mode of pulverizing it? A. Use charcoal, which can be easily pulverized in a mortar. Coating posts, which have been charred, with coal tar is a better preservative, the absorbent properties of the charcoal on the surface causing the tar to penetrate to a good depth.

(27) W. J. E. asks: What proportion of an iceberg is under water? A. About seven-eighths of its volume.

(28) H. O. W. asks: 1. Is there any government land in Indiana or Illinois unclaimed? If so, how can it be acquired by settlers? A. Address the Land Commissioner of the States referred to. There is also an official of that title in Washington whom you may consult on these points. 2. Will tincture of cantharides cause increased growth of hair or beard without injury, and how is it applied? A. It is an irritant, and is used to induce growth where morbid action exists. It is the basis of many hair invigorators, but fails of action where the hair is dead. A well known preparation is: Scald black tea 2 ounces, with 1 gallon boiling water, strain, and add 3 ounces glycerine, tincture cantharides ½ ounce, and bay rum 1 quart. Mix well by shaking, and then perfume. 3. What will remove tan or sunburn from the face? A. Use a mixture of magnesia in soft water, spread on the face, and after a minute or two wash off with Castile soap suds and rinse with soft water.

(29) L. M. asks (1) for some receipt for promoting the growth of hair. A. See preceding answer to H. O. W. 2. One to remove the same without injury to the skin. A. Use a strong solution of barium sulphide made into a paste with powdered starch. It should be applied immediately after it is mixed, and allowed to remain there for 5 or 10 minutes. If not used very carefully, it may injure or mark the skin.

(30) G. H. S. asks: What will take oil, grease, butter, or any substance of an oily nature out of writing paper? A. Use pipe clay, powdered, and mixed with water to the thickness of cream; leave it on for some hours.

(31) Derfla asks how to restore a type writer ribbon where the ink has become dried in. A. If it has enough color left, put on a little glycerine. For a new ribbon, or complete renovating, take of aniline black ½ ounce, pure alcohol 15 ounces, and concentrated glycerine 15 ounces. Dissolve the aniline black in the alcohol and add the glycerine.

(32) W. S. asks: What is liquid anhydrous ammonia? Can you favor me with the method of making same on a small scale? A. It is liquefied ammoniacal gas, NH_3. Liquid ammonia may be produced by leading the anhydrous ammoniacal gas into a tube plunged in a freezing mixture composed of crystallized calcium chloride and ice, having a temperature of —40°. See Roscoe's "Treatise on Chemistry," vol. i.

(33) T. R. J. asks: Which of the common metals are most susceptible to heat and cold? A. Mercury and zinc.

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

P. R.—The metallic portion is pyrite or sulphide of iron, and utterly valueless.

INDEX OF INVENTIONS

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AND EACH BEARING THAT DATE.

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