part of the State of New York. On passing through the old settlement of Cherry Valley, he was requested to take charge of the Presbyterian Church at that place; he accepted the call, and in addition to his pastoral duties became the teacher in the Academy. Two or three years afterward he was called to the Presbyterian Church, at Albany, where he took a prominent position as a preacher. In 1804 he was chosen President of Union College, Schenectady, N. Y., which place he continued to fill for 58 years. More than 3,500 students were graduated during his presidency, and in their number may be found some of the most eminent men in the country. Union College was emphatically of his own formation. He came to it in its poverty and infancy, and raised it to wealth and reputation In 1854 the semi-centennial anniversary of his presidency was celebrated, when between 600 and 709 of the men who had been graduated under him came together to do him honor. Dr. Nott was an earnest advocate of the temperance cause, and published "Lectures on Temperance" in 1847. Though he has written much, his other publications are confined principally to occasional addresses and "Counsels to Young men." He gave a great deal of attention to the laws of heat, and besides obtaining thirty patents for applications of heat to steam engines, the economical use of fuel, etc., was the inventor of a stove bearing his name, which has been very extensively used. He died in Schenectady, January 29, 1866.

Immediately behind Dr. Nott stands

CAPT. JOHN ERICSSON,

whose great genius as an inventor and engineer are universally acknowledged. He was born in the province of Wermeland, Sweden, in 1803. The son of a mining proprietor, his earliest impressions were derived from the engines and machinery of the mines. In 1814 he attracted the attention of the celebrated Count Platen, and in 1829 he entered the Swedish army as an ensign, and was soon promoted to a lieutenancy. His regiment being stationed in the highlands, where government surveying was in progress, Ericsson surveyed upwards of fifty miles of territory, detailed maps of which, executed by his own hands, are yet in the archives of Sweden. He visited England in 1826, with a view of introducing his invention of a flame engine; not succeeding, he abandoned the idea, and numerous other inventions followed. He joined the house of Braithwaite, London, where he introduced several improvements in steam boilers. In the fall of 1829 his invention was applied to railway locomotion on the Liverpool and Manchester Railway. The directors had offered a prize for the best locomotive engine, and within seven weeks of the time of trial Ericsson heard of the offer, planned an engine, executed the working drawings, and completed the machine. The lightest and fastest engine started on this occasion was the "Novelty," which, guided by its inventor, Ericsson, started off at the rate of fifty miles an hour. A similar engine, of great power, he subsequently constructed, for the King of Prussia. For this invention he received the prize medal of the Mechanics' Institute, in New York. In 1833 he reduced to practice his long cherished project of a caloric engine, and submitted the result to the scientific world in London. Ericsson's attention was next directed to navigation; the result revolutionized the navies of the world. He was employed through Capt. R. F. Stockton, of the U. S. Navy, in the construction of the U. S. ship of war, *Princeton*, the first steamship ever built with the propelling machinery below the water line. In the United States division of the great exhibition in London, 1851, Ericsson gained the prize medal for a large number of important inventions there exhibited. In 1852, he was made Knight of the order of Vasa, by King Oscar, of Sweden. The same year brought out his caloric engine in the ship *Ericsson*. It propelled a ship of 2,000 tuns from New York to Alexandria, in the winter of 1853. It was visited there by the President and heads of the departments. His caloric engine has been perfected, and a large number are in successful operation. His greatest triumph was the invention and construction of the *Monitor*. He is still designing and improving naval batteries, and at the same time conducting extensive researches on the subject of solar heat, with a view to its application as a motive power, and also in other scientific fields. Probably no man in America has a better appreciation of the value of time than Capt. Ericsson. He economizes every moment. We are informed, that he has for thirty successive days, worked eighteen hours each day. He rarely leaves his house unless obliged to do so, and allows himself no leisure for social recreation. The speed with which he masters details and throws off designs, is said to be probably unparalleled. His manners are simple and dignified, but, without any assumption, he impresses every one with whom he comes in contact, by his broad views and rich stores of learning. His inventions are numerous and various, but they all bear the true stamp of genius.

FREDERICK E. SICKLES,

seated a little to the left of Dr. Nott, was born in the State of New Jersey in the year 1819. While an apprentice at the "Allaire Works," New York, he invented a "Cut Off," which improvement has become extensively known, not only from its great value in the saving of expense for fuel in the working of steam engines, but also from the litigation that existed during the lifetime of the patent. Although in controversy during the entire fourteen years, for which term the patent was granted, Mr. Sickels could obtain from the courts but partial protection to his rights, and it was not until after the patent had expired, and its extension had been refused by the Patent Office, that he obtained a decision from the highest court that he *was* the inventor of the improvement known as the "Sickels' Cut Off." Mr. Sickels has taken out twelve patents for as many distinct improvements in steam engines, all which have gone into extensive use. His latest invention for steering vessels by steam power has been successfully applied to government and merchant steamers, and was favorably received in England at the great exhibition in London, 1862, where it received the Great Medal.

The most prominent figure in the group occupying the middle foreground of the picture is that of

SAMUEL FINLEY MORSE,

who was born in Charlestown, Mass., April 27, 1791. He graduated at Yale College in 1810, and went to England with Washington Allston in 1811, to study painting under his tuition and that of Benjamin West. In 1813 he received the gold medal of the Adelphi Society of Arts, at the hands of the Duke of Norfolk, for an original model of a "Dying Hercules," his first attempt at sculpture. He returned to the United States in 1815, and in 1824-25 with some other artists of New York, organized a drawing association, which, after two years' struggle against various obstacles, resulted in the establishment, in 1826, of the present "National Academy of Design." Mr. Morse was chosen its first President, and was continued in that office for sixteen years. In 1829 he visited Europe the second time to complete his studies in art, residing for more than three years in the principal cities of the continent. During his absence abroad he had been elected to the professorship of the literature of the arts of design in the University of New York, and in 1835 he delivered a course of lectures before that Institution on the affinity of those arts. While at Yale College, Mr. Morse had paid special attention to chemistry and natural history to such a degree, that, from being subordinate as recreations, they had become a dominant pursuit with him. The electro-magnet on Sturgeon's principle (the first ever shown in the United States) was exhibited and explained in Dana's lectures, and at a later date by gift of Professor Toney, came into Morse's possession, and this same magnet is used in every Morse telegraph throughout both hemispheres. It was on board ship bound for Havre in 1832, and in a casual conversation with some of the passengers concerning recent discoveries in France, regarding the means of obtaining the electric spark from the magnet, that Morse's mind conceived not merely the idea of an electric telegraph, but of an electro-magnetic recording telegraph, as it now exists. The testimony to the paternity of the idea in Morse's mind, and to his acts and drawings on board the ship is ample; so that the court and judges before whom he appeared were satisfied with his claim; the date of 1832 is therefore fixed by this evidence as the date of Morse's conception of the telegraph system which now bears his name. In the latter part of this same year he reached home, prosecuted his studies, and prepared portions of his apparatus. The first instrument was shown in successful operation to many persons in 1835 and 1836, for the purpose of communicating from and to a distant point. In 1837 he completed and exhibited his whole plan at the University of New York. Application was made to Congress in 1842 without success. But in March of 1843 he was startled with the news that Congress, near the midnight hour of the last session, approved his plans and had placed at his disposal the sum of $30,000, to make the experiment between Washington and Baltimore; all know the result. Submarine telegraphy originated also with Professor Morse. He laid the first submarine telegraph lines in New York harbor in 1842, and received a gold medal for that achievement. One of the most prominent figures on the right of the picture is that of

HENRY BURDEN,

an inventor and mechanic, who was born at Dunblane, Scotland, April 20, 1791. His father was a farmer, and it was while a youth engaged on the farm that the son gave evidence of inventive genius, by making with his own hands labor-saving machinery from the roughest materials, and with but few tools and no models. The first marked success was in constructing a thrashing machine. He afterwards engaged in erecting grist-mills and making various farm implements. During this period he attended the school of William Hawley, an accomplished arithmetician; and afterwards, having resolved to try his fortunes in America as a machinist and inventor, he went to Edinburgh and entered upon a course of studies, embracing mathematics, engineering and drawing. Arriving in this country in 1819, he devoted himself to the improvement of agricultural implements. His first effort was in making an improved plough, which took the first premium at three county fairs. In 1820 he invented the first cultivator in the country. In 1825 he received a patent for his machine for making the wrought spike, and in 1835 for a machine for making horseshoes. 1840 he patented a machine for making the hook-headed spike, an article which is used on every railroad in the United States. In the same year he patented a self-acting machine for reducing iron into blooms after puddling. In 1843 he patented an improvement in his horseshoe machinery. In 1849, he patented a self-acting machine for rolling iron into bars. In June, 1857, he patented a new machine for making horseshoes. This may be considered his greatest triumph in mechanics; it is self-acting and produces from the iron bars sixty shoes per minute. He has obtained patents for this machine from every prominent government in Europe. Mr. Burden's suspension waterwheel is another of his inventions. In 1833, he built a steamboat 300 feet long, with paddle-wheels 30 feet in diameter; from its shape it was called the "segar boat." It was lost through the mismanagement of the pilot. In 1836, Mr. Burden warmly advocated the construction of a line of ocean steamers, of 18,000 tuns burden. In 1845, when the steamer *Great Britain* was crippled by breaking one of her screw blades, Mr. Burden went to England for the especial purpose of inducing her owners to adopt the sidewheel, but was unsuccessful. He is now a resident of Troy, N. Y., and is highly esteemed as a citizen.

The remaining portraits are those of Richard March Hoe, Erastus B. Bigelow, and Elias Howe, biographical sketches of whom will be given in a future number.

MICROGRAPHS.

The microscopist often desires to secure in permanent form, the beautiful and curious objects which are revealed to his eye. Recourse is frequently had to the pencil and the prism, success being in direct proportion to the skill. Photography affords the best means, and by its employment we obtain exact copies of the magnified objects. Such pictures are called micrographs, and are produced by combining a microscope with a photographic camera. These combinations are generally expensive; but their operation is simple, and they are easily managed.

Mr. Louis Edward Levy, of Milwaukee, Wis., sends us some micrographs of his own production, which are creditable to him as an amateur, especially when we consider the simplicity and cheapness of the apparatus by which they were produced. Over the eye-glass tube of an ordinary achromatic microscope, he places a sleeve or ferule, to which is attached a small box, having its rear part open so as to receive the plate-holder which fits nicely into the box. The interiors of box and plate-holder are painted black. In focusing, a frame with ground glass takes the place of the plate-holder. With a microscope and camera, thus made, all objects visible by means of the microscope may be readily photographed. Mr. Levy states that his box was made of tin, and the whole expense was only $3.

Report on Steam Boilers Exhibited at the Recent Fair of the American Institute.

THE HARRISON SAFETY BOILER—FIRST MEDAL AND DIPLOMA.—1st. Safety. 2d. Economy of space. 3d. Economy of fuel.—This boiler was the only one which was found reliable and capable of driving the engines at the Exhibition, and which did furnish all the steam for the competition tests of the engines.

Root's Wrought-Iron Sectional Boiler—Second premium and diploma for facility of repairs and economy of space.

If any of our readers have been kept awake by the problem we gave them last week in regard to this report, they may now rest easy—the report is made.

How about the evaporation power of these boilers? How about the quality of steam produced? How about the boilers exhibited, not mentioned in the report? We recommend any who wishes to see how much can be said without saying anything, to put the report on engines and this on boilers side by side, and study them together.

The Gold Hill Fire Still Burning.

The terrible and fatal fire which broke out in the Gold Hill (California) mines on the 7th of April last, and which resulted in the destruction of a large number of lives, is still smouldering. After it had been reduced to close quarters, it was carefully walled in, and work was again started in different directions around it. It was thought to have been extinguished long ago; but such, it appears, is not the case, for a few days since some miners working between the 600 and 700-foot levels of the Kentuck mine suddenly picked through into a space where there was plenty of fire, finding large brands of it. The place was at once closed up again. Being as far as possible shut in and kept from the encouragement of atmospheric air, the fire merely smoulders, but it is there, nevertheless, and may keep on burning for many months to come. It can do no particular harm, however, as it is merely burning out the old timbering where the mine has been worked out.

Obituary---Death of Mr. John Degnon.

We regret to announce the death of Mr. John Degnon, whom our readers will recollect as the engineer who took the locomotive *Best Friend* to Charleston in 1836, and set it running, and therefore claimed to be the first man who ever ran a locomotive in the United States. When we saw him last he appeared in good health, but he died of paralysis, at Boston, on the third of December, aged 59 years. He was a skillful mechanic. He learned his trade at West Point Foundery, and has been successively engineer on the steamships *Arctic* and *Re d'Italia*.

REMITTANCES should be made in money orders, bank checks, or drafts, if possible. When neither of these can be procured, send the money in a registered letter. The present registration system is virtually an absolute protection against losses by mail, and all postmasters are obliged to register letters whenever requested to do so.

AGENTS who receive their weekly supply of the SCIENTIFIC AMERICAN through news companies, are urged to canvass their localities. By a little effort among intelligent mechanics and manufacturers, they can add largely to their lists. We will send specimen numbers, when desired, for that purpose.

SUBSCRIBERS who wish to have their volumes bound, can send them to this office. The charge for binding is $1·50 per volume. The amount should be remitted in advance, and the volumes will be sent as soon as they are bound.

CITY SUBSCRIBERS will continue to be served, either at their residences or places of business, at $3·50 a year. Send in your names and the carrier will serve you faithfully.

OUR rule of prepayment of all subscriptions is so rigidly enforced that whoever receives the paper regularly may consider it paid for. No names are entered on the subscription books without advance payment.

© 1869 SCIENTIFIC AMERICAN, INC.

Powerful Turbines.

A correspondent of the *American Odd-Fellow*, which, by the way, is a very well conducted and popular magazine, thus describes the turbines used in the Mastodon Mill, in the village of Cohoes, New York.

"The entire number of looms in this mill is fourteen hundred and eighty-six; five hundred of which are located on the first floor." These looms and the other machinery of the mill are driven by three "immense turbine water wheels, made by the Ames Manufacturing Company, which operate the main shaft, and possess an aggregate driving capacity of over eleven hundred horse power. This pit having an extreme depth of forty feet, with a floor twenty-five feet from the surface, which hides the water wheels from a top-view, is in reality an underground two-story building. Three mammoth cast-iron cylinders, eight feet each in diameter, convey the water from the canal on the west side of the building to the wheels; the volume of water being regulated by a sort of tiller located in the pit, and connected with the flood-gates. The perpendicular shaft of each turbine is connected with the main shaft by beveled gear, and the united power exerted, if so applied, would reverse the motion of the great Burden water wheel at Troy, and drive the machinery of a good-sized manufactory besides. The shaft to which this wondrous power is applied is supported by three granite abutments, and forms the axis of six ponderous driving pulleys, twelve feet each in diameter. The immense belts which radiate to all parts of the building are in keeping with the massive pulleys and gearing. These are each two feet wide, and the longest one, reaching to the fifth story, measures nearly two hundred feet. At the north end of the pit, two rotary force pumps are located, which, in case of fire, can be instantly geared to the main shaft by means of a sliding cog wheel, and are jointly capable of throwing six thousand gallons of water per hour."

A Balloon View of a London Fog.

A London paper says:—"On Wednesday afternoon, when London and the suburbs were enveloped in a dense fog, Mr. Coxwell made a balloon ascent from the Hornsey Gas Works. The ascent took place at 2:40, when the atmosphere was clear. Soon after three o'clock the fog extended exactly in the direction the balloon was traveling, and presented a strongly defined line of vapor stretching for miles in an easterly direction. The formation of this fog, as witnessed by Mr. Coxwell from his balloon car, was, we hear, one of the most interesting occurrences in the adventurous life of the experienced aeronaut, and will no doubt be fully described. Over the Forest, near Woodford, Mr. Coxwell and his companion were unable to see the earth at a hight of only fifty feet, and it was only by the aid of a rope trailing on the ground, that a level course could be regulated so as to select an open spot on which to alight. While holding conversation with some men who were following the balloon, and could only hear the rustling of a rope among the bushes and trees, the aeronauts were supposed to be poachers. Keepers, who were in close pursuit, rushed upon the strangers when Mr. Coxwell cast his grapnel in a hedge, and great was their surprise when they discovered what kind of a net and cordage it was trailing over the park. So dense was the fog, that the balloon could not be seen, and the voyagers were supposed to be running along the ground, although Mr. Coxwell proclaimed his balloon, but this was thought to be a ruse to draw off the keeper's attention. Notwithstanding the difficult position, Mr. Coxwell was placed in as to landing, still a safe descent was made."

A PEANUT picker was among the new labor-saving machines exhibited at the Virginia State Fair Hitherto the nuts have been picked off the vines by hand; four bushels a day being the fair average for a hand. A farmer who raised 1,000 bushels required ten hands for nearly two months to save his crop, at a cost of fifteen cents per bushel. The crop raised on the south side of James river, between Petersburg and Norfolk, is estimated at 1,000,000 bushels a year. To save this crop would require the labor of 6,000 hands for two months, at a cost of $200,000. The new machine is said to save much time and labor.

A RAZOR INDEED!—Mr. J. W. Churchill, of Willkesbarre, Pa., thinks people hone and strop razors too much. He has used one for two years without either honing or stropping it, and it still cuts his beard well, though latterly it begins to pull—a little. He means to use the razor until compelled to sharpen it, but he can still cut a hair held in his fingers with it. Mr. Churchill thinks his razor hard to beat, and we think his beard must be still harder to beat if it has with constant use not dulled a razor in two years. The very thought of it makes our face smart.

CLOTHES WRINGERS.—These indispensable household articles are becoming more generally introduced than almost any other labor-saving machinery. It is but a few years since the first patent was taken out on a clothes wringer and now there are but few families that do not use them. A good article in the clothes-wringer line is advertised on another page.

WATER WHEEL EXPERIMENTS.—We have the promise of a report of the recent trial of water wheels at Lowell, Mass., for publication in our next number.

Answers to Correspondents.

L. B. F., of N. Y.—The power to direct safeguards in the use steam boilers, and to provide for the inspection of stationary steam boilers is vested in the local boards of health by the Statutes of New York. These boards are, we believe, appointed by supervisors, unless the Boards are organized under a special commission like the Metropolitan Board of Health, and have power to enforce their requirements. There is no general law requiring the use of lock-up safety valves on such boilers.

A. F. W., of Mass.—To set the tail-stock of a lathe so as to turn a taper, you must set it off the center half the amount of the taper. A good practical way to do this is to turn down the work at each end to the size you want it before altering the lathe. Then set your tool accurately to the larger end of the work, and run it along opposite the smaller end and use it as a gage in moving the tail stock off the center.

J. A. M., of N. Y.—A wheel intended to roll around a circle eight feet in diameter, would need, in order that it should not grind but roll freely around the circle, to be beveled so as to incline the outer surface one foot from the perpendicular.

W. H. G., of Ohio.—We have no report upon the experiment of carrying fresh meats in the ship *Henry Taber*, constructed for that purpose. If it succeeds we shall certainly hear of it and will publish the fact.

C. P., of N. H.—The light minerals you send are common quartz crystals. The red colored specimens are garnets. They contain silicate of alumina, iron, etc.

J. L. T., of Me., and J. A. B., of Mass.—The Report of the Smithsonian Institute is prepared by Prof Henry, Washington, D. C. You had better write to him on the subject.

E. A. G., of Mass.—"Byrne's Practical Metal-workers' Assistant," contains the exact information you require. Published by Henry Carey Baird, Philadelphia.

D. W. R., of Mich.—Your question cannot be answered without diagrams, and it is not of enough general interest to warrant our doing this.

J. R., of Iowa.—The protoxide of chromium is a compound of 26 parts of the metal chromium and 8 of oxygen.

C. C., of O.—The best food for fishes, in a fresh water aquarium is dried beef cut up very finely.

G. B., of Me.—We have had no personal experience in the lumber trade, and cannot answer the point of your inquiry.

F. H. G., of Mass.—The mineral you send appears to be a species of conglomerate. We discover no shells.

F. D., of La.—The red-colored mineral contains iron ore.

S. K. P., of Del.—We cannot explain the phenomenon to which you refer; but your only relief consists in thorough drainage.

C. S. J., of N. Y.—You can render mull or jaconet much stiffer than starch can make it by the use of isinglass size.

Business and Personal.

The Charge for Insertion under this head is One Dollar a Line. If the Notices exceed Four Lines, One Dollar and a Half per line will be charged.

To ascertain where there will be a demand for new machinery or manufacturers' supplies read Boston Commercial Bulletin's manufacturing news of the United States. Terms $4 00 a year.

Wanted—Brick-making machine circulars. Box 6001, N. Y.

In actual use—"Broughton's" Oil Cups and Lubricators have proved to be superior to any. Address, for circulars, H. Moore, 41 Center st., New York.

Peck's patent drop press. Milo Peck & Co., New Haven, Ct.

Back Nos., Vols., and Sets of Scientific American for sale. Address Theo. Tusch, No. 37 Park Row, New York.

Mineral Collections—50 selected specimens, including gold and silver ores, $15. Orders executed on receipt of the amount. L. & J. Feuchtwanger, Chemists, 55 Cedar st., New York.

The Babcock & Wilcox Steam Engine received the First Premium for the Most Perfect Automatic Expansion Valve Gear, at the late Exhibition of the American Institute. Babcock, Wilcox & Co., 44 Cortlandt st., New York.

For best quality Gray Iron Small Castings, plain and fancy Apply to the Whitneyville Foundery, near New Haven, Conn.

Keuffel & Esser, 71 Nassau st., N.Y., the best place to get 1st-class Drawing Materials, Swiss Instruments, and Rubber Triangles and Curves

Foot Lathes—E. P. Ryder's improved—220 Center st., N. Y.

Those wanting latest improved Hub and Spoke Machinery, address Kettenring, Strong & Lauster, Defiance, Ohio.

For tinmans' tools, presses, etc., apply to Mays & Bliss, Brooklyn, N. Y.

Mill-stone dressing diamond machine, simple, effective, durable. Also, Glazier's diamonds. John Dickinson, 64 Nassau st., New York.

Send for a circular on the uses of Soluble Glass, or Silicates of Soda and Potash. Manufactured by L. & J. W. Feuchtwanger, Chemists and Drug Importers, 55 Cedar st., New York.

Glynn's Anti-Incrustator for Steam Boiler—The only reliable preventative. No foaming, and does not attack metals of boiler. Liberal terms to Agents. C. D. Fredricks, 587 Broadway, New York.

Cold Rolled—Shafting, piston rods, pump rods, Collins pat. double compression couplings, manufactured by Jones & Laughlins, Pittsburgh, Pa.

For solid wrought-iron beams, etc., see advertisement. Address Union Iron Mills, Pittsburgh, Pa., for lithograph, etc.

Machinists, boiler makers, tinners, and workers of sheet metals read advertisement of the Parker Power Presses.

Diamond carbon, formed into wedge or other shapes for pointing and edging tools or cutters for drilling and working stone, etc. Send stamp for circular. John Dickinson, 64 Nassau st., New York.

The paper that meets the eye of manufacturers throughout the United States—Boston Bulletin, $4·00 a year. Advertisements 17c. a line.

Winans' boiler powder, 11 Wall st., N. Y., removes Incrustations without injury or foaming; 12 years in use. Beware of Imitations.

INDEX.

ILLUSTRATIONS.

MISCELLANY.

Figures preceded by a *Star* (*) refer to illustrated articles

© 1869 SCIENTIFIC AMERICAN, INC.