JOSEPH HENRY.

BY CUYLER REYNOLDS.

Owing to Joseph Henry's position in the history of American science, it has been deemed advisable by the citizens of Albany fittingly to celebrate the anniversary

JOSEPH HENRY.

of his birth on December 17, as he was born in that city one hundred and two years ago. A few years from now all evidence will be either hearsay or that which is contained in books. To-day there live a few who recall him as he was far back in the century, when as a vigorous young man with residence in Albany, N. Y., he astonished the world by the success of some of his greatest works.

Few men of his time have been so active as was Henry during three quarters of a century. When contemplating the long list of inventions, most of them world famous, placed to his credit, it is cause for wonder, intermingled with admiration, that one man was able to do so much and do that remarkably well. Faraday's experiments in electricity established his name, never to be erased from the roll of great men; but one finds in reviewing the life-work of Henry equally as many and as valuable inventions, or more properly speaking additions to the sum total of scientific knowledge of the world, the product of a wonderfully organized mind. There were bright minds here and there, in Great Britain, France, Germany and Italy, at work upon similar lines of scientific development. Each made discoveries of great value, but the sense of satisfaction must be great to-day to every American to read that Henry antedated each of them. They worked until they produced something new, but Henry was like the combination of all of them, and, moreover, preceded them in each case. A report coming from Europe, by slow process in those days when there was limited interchange of thoughts between two continents, of some striking invention would be met by the printed paper on the same subject from Henry, showing that none could equal him in his march.

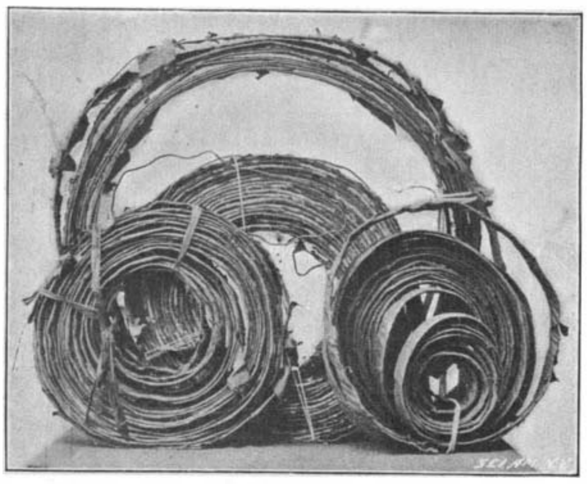
Prof. Joseph Henry was born in Albany, N. Y., December 17, 1797, and spent the greater part of the first thirty-five years of his life there. It was there that he attended school, in the Albany Academy, organized in 1813, being one of the 92 pupils first enrolled. His grandparents on both sides came to this country from Scotland, landing on June 16, 1775, the day before the battle of Bunker's Hill. When seven years old he went to Galway, Saratoga County, to reside with his maternal grandmother, and he continued there some time, as his father died before he could make any other arrangements for young Henry's future. He was sent to the district school, where Israel Phelps was master, and at ten entered the service of Mr. Broderick in his village store, but through the latter's kindness was allowed to attend afternoon sessions of the school.

When fifteen years of age he returned to Albany to enter a watchmaker's shop. Strange as it may seem to those who realize how modest and retiring was his character in later years, he shortly gave way to the inclination, aroused by attending his first play on a visit to Albany, and cast his lot with theatrical people. For this he spent all his spare money and became an expert in preparing stage mechanism. Perhaps this was but a second stepping-stone toward the combining of materials in scientific instruments. He joined the private theatrical association in Albany styled "The Rostrum," and the originality of his scientific effects gained somewhat of a reputation for him. When the watchmaker left Albany young Henry had free rein to follow his vocation, dramatized a tale and produced a comedy. What a contrast to his other papers for fifty years after! A second accident, but this a physical one, confined him to the house, where he continued his acquaintance with books. These were philosophical works which he took up, and they produced a train of thought that effaced recollection of the stage. It was then the serious thinking of his life commenced and marked his coming to the Academy as an advanced student under Dr. T. Romeyn Beck; but he was obliged to pay his way by teaching in a district school. Then he became an assistant in the Academy, and again a private tutor in the family of Gen. Stephen Van Rensselaer. In 1826 he was engaged in a surveying expedition under the State, and laid out a road through the southern counties. Had the appropriation for continuing similar work passed, Henry might have continued as a successful surveyor; but it did not, and this brought him to the turn in the road again that led to success as a scientist. The vacant chair in mathematics and natural philosophy in the Academy offered was accepted, and his researches dated from that time. He associated himself with the Albany Institute while a tutor in Gen. Van Rensselaer's family, the latter being the president of the Institute, and Henry's first paper, presented October 30, 1824, when he was 26 years old, was: "On the Chemical and Mechanical Effects of Steam." He illustrated this by apparatus prepared by himself. He demonstrated a striking paradox, that the jet of steam will not scald the hand at a prescribed near distance from the jet, provided the steam be sufficiently hot.

PROF. HENRY'S HOME IN ALBANY, 1832, RECENTLY DEMOLISHED.

Prof. Henry's home was No. 105 Columbia Street. The location is within sight of the new Capitol, perhaps 300 yards distant. It struggled hard apparently to survive its century of usefulness, for the old house was torn down this centennial year after appearing for ten years in most dangerous condition.

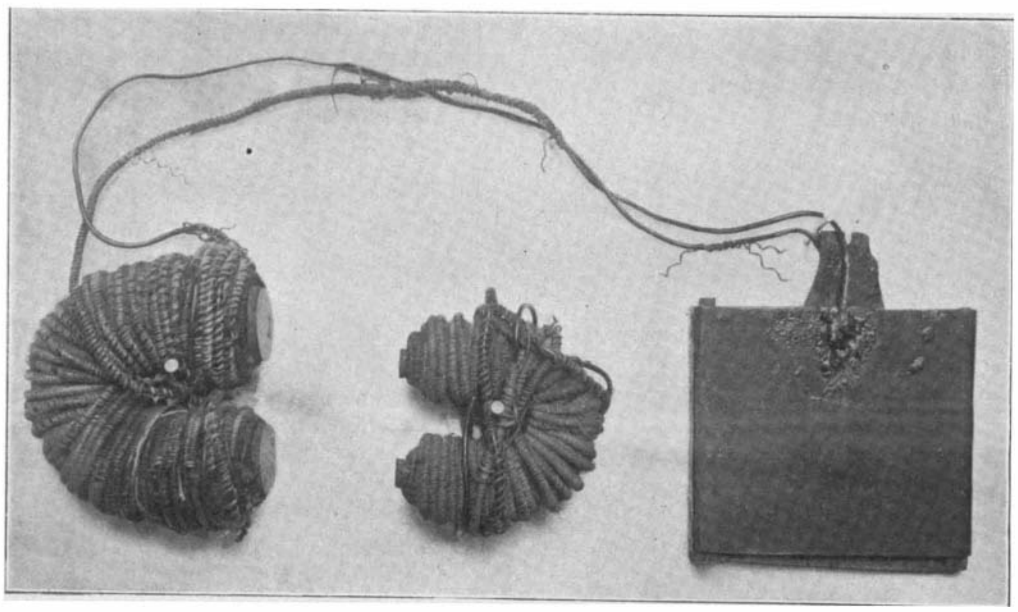
Among Henry's early friends were Hon. George W



INDUCTION COILS USED BY HENRY TO INVESTIGATE THE DISCHARGE OF LEYDEN JARS. PRINCETON UNIVERSITY MUSEUM.

Carpenter, Dr. Philip Ten Eyck, Thomas Hun, M.D., and Orlando Meads. Carpenter was at first a student under him, then, in 1828, when seventeen years old, first assistant engineer in the United States service, and in 1830 a tutor in the Academy. He not only helped in preparation of the apparatus for the test of the telegraph, but was one of that select group present when the demonstration was made. Mr. Carpenter is still living, and resides in Albany; sound in body and in mind, although in his eigthy-ninth year. He states from personal knowledge that it was in the northwest corner of the basement of the Academy that Henry had his laboratory. The first experiments, however, were conducted in a room up stairs. The wire was strung about the ceiling of this room, and in one window was placed the apparatus, consisting of magnet and small bell. Many wrongfully suppose, from historical accounts, that it was the tinkling of this bell that thrilled the audience, certainly a gathering not appreciative of what was being manifested, but the bell itself did not move. It has a brass clapper, but the sound was produced by the striking of a steel rod against it. This little bell that played so important a role is now owned by Miss Caroline Ten Eyck, of Albany.

This bell measures $1\frac{5}{8}$ inches in height, and $1\frac{3}{4}$ inches in width at the mouth. It served as a part of a sounder, and as Mr. E. N. Dickerson remarked some years later in a lawsuit, "the thing was perfect as it came from its author, and it has never been improved from that day to this as a sounding telegraph." More striking still was the remark that the idea of Morse of impressing an alphabet upon strips of paper was abandoned, and people have gone back to the way Henry demonstrated it in the Academy that day, reading the signals by sound. This test was made in 1830. What led up to this discovery was his experiment with magnets. He commenced the study in 1828, exhibiting before the Albany Institute a small-sized electro-magnet closely wound with silk-covered copper wire (see engraving). The former plan had been to insulate the bar or core. By his compact method he obtained more turns, which were also more nearly at right angles with the magnetic axis, and thereby gained greater power. To Henry the world is indebted for having first constructed the magnetic "bobbin" which has come into universal use in electro-magnetism. In 1830, assisted by



THE FIRST MAGNETS WITH SEVERAL LAYERS OF INSULATED WIRE, 1828.

Dr. Ten Eyck, he tried larger bars of soft iron, and about one he wound 540 feet of copper wire in nine coils of 60 feet each, which coils surrounded the branches of the horseshoe. By properly connecting the pairs of wires he obtained a wonderful increase in power. This magnet was suspended in a rectangular wooden frame. The lifting power was 650 pounds and only a single battery was used, consisting of two concentric copper cylinders with zinc between, the zinc surface measuring only ⅖ of a square foot, with only a half pint of dilute acid.

Evidently Henry was aroused to make researches by

BELL USED IN THE FIRST TELEGRAPH EXPERIMENT, 1830. ACTUAL SIZE.

the strong desire to expound before his class more than was contained in the text books. The late Prof. James Hall, the renowned geologist, attests what has been said about the invention of the telegraph from his own experience, in the following words, after describing the arrangement of the circuit:

"And at one termination of this, in the recess of a window, a bell was fixed, while the other extremity was connected with a galvanic apparatus. You showed me the manner in which the bell could be made to ring by a current of electricity transmitted through this wire, and you remarked that this method might be adopted for giving signals by the ringing of a bell at a distance of many miles from the point of its connection with the galvanic apparatus."

It is entirely unnecessary to indulge in discussion of the precedence of the Henry and Morse early developments of the telegraph, for the matter was decided by a committee of the Smithsonian Institution, whose business it was to investigate and which determined that Henry was the originator, and more forceful even than this is what Morse said regarding how he commenced his experiments three years later than Henry's practical demonstration.

Morse's telegraphic apparatus lacked the powerful magnets that Henry invented. It was shown in court that his invention, embracing his system, would have failed had not Henry's invention in this line helped him to surmount the difficulty. Morse, having worked out a practical telegraphic system, has been given credit in the popular mind for the whole, but the work accomplished by Henry made it possible for Morse to render his system practicable. In spite of the rivalry between the two inventors and all that was said at the time in disputing the claims of priority for the two by their supporters, Henry brightened Morse's darkest hours, between 1839 and 1843, by encouraging him, which goes to prove that Henry was satisfied with discovery, and was only too glad that others might benefit pecuniarily. The letter that Henry wrote to Morse refers to a prospective test of the latter's invention in practice by a line of forty miles, connecting Baltimore with Washington:

"Princeton College, February 24, 1842.

"My Dear Sir: I am pleased to learn that you have again petitioned Congress in reference to your telegraph; and I most sincerely hope you will succeed in convincing our Representatives of the importance of the invention. . . . Science is now fully ripe for this application, and I have not the least doubt, if proper means be afforded, of the perfect success of the invention. With my best wishes for your success, I remain with much esteem, Yours truly,

"Joseph Henry."

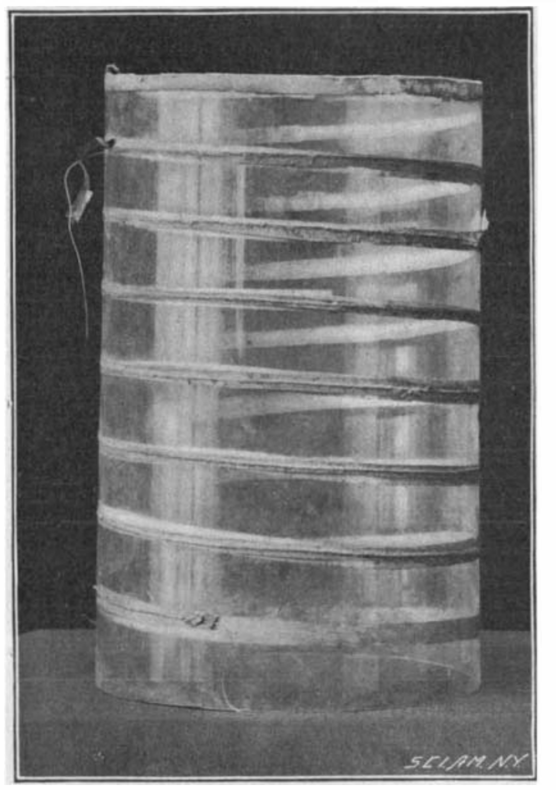
In December, 1842, the sum of $30,000 was appropriated, passing the House of Representatives on February 23, 1843, and the Senate on March 3. The four wires were extended, and on May 24, 1844, the first message was sent. The success led to many inventions all over the country, and they to many lawsuits brought by and against Morse. These brought out the priority of claims, and rivalry between Morse and Henry was engendered. Henry was defended by the Regents of the Smithsonian Institution, who certified to the priority of Henry's researches and indorsed his claims, which were:

"1. Previous to my investigations, the means of developing magnetism in soft iron were imperfectly understood, and the electro-magnet which then existed was inapplicable to the transmission of power to a distance. 2. I was the first to prove by actual experiment that in order to develop magnetic power at a distance, a galvanic battery of intensity must be employed to project the current through the long conductor, and that a magnet surrounded by many turns of one long wire may be used to receive the current. 3. I was the first actually to magnetize a piece of iron at a distance, and to call attention to the fact of the applicability of my experiments to the telegraph. 4. I was the first to actually sound a bell at a distance by means of the electro-magnet. 5. The principles I had developed were applied by Dr. Gale to render Morse's machine effective at a distance. The results here given were among my earliest experiments, in a scientific point of view considered then of much less importance than what I subsequently accomplished; and had I not been called upon to give my testimony in regard to them, I would have suffered them to remain without calling public attention to them, a part of the history of science to be judged of by scientific men, who are the best qualified to pronounce upon their merits." (Smithsonian Report for 1857.)

It was Henry who explained the difference between "intensity" and "quantity" to Morse, and L. D. Gale testified that he saw the imperfection in Morse's work and advised him that—

"The sparseness of the wires in the magnet coils and the use of the single cup battery were to me, on the first look at the instrument, obvious marks of defect, and I accordingly suggested to the professor, without giving my reasons for so doing, that a battery of many pairs should be substituted for that of a single pair, and that the coil on each arm of the magnet should be increased to many hundred turns each; which experiment, if I remember aright, was made on the same day with a battery and wire on hand, furnished, I believe, by myself, and it was found that while the original arrangement would only send the electric current through a few feet of wire, say 15 to 40, the modified arrangement would send it through as many hundred. Although I gave no reasons at the time to Prof. Morse for the suggestions I had proposed in modifying the arrangement of the machine, I did so afterward, and referred in my explanation to the paper of Prof. Henry in the 19th volume of the American Journal of Science, page 400 and onward. . . . At the same time I gave the suggestions above named, Prof. Morse was not familiar with the then existing state of the science of electro-magnetism. Had he been so, or had he read and appreciated the paper of Henry, the suggestions made by me would naturally have occurred to his mind as they did to my own. . . . Prof. Morse professed great surprise at the contents of the paper when I showed it to him."

There is no question regarding the serious handicap placed on Henry's labors through lack of funds. This did not so much affect the needful purchases for science, which were, however, a tax; but cramped the time which he could devote to research. In both ways the remedy was advantageously found in one who was his most intimate friend during the time that he was working in the Albany Academy. This man was Dr. Philip Ten Eyck. The friend relieved Henry of the labor of making many of the parts of the now famous telegraph machine, supplying them from his own purse and contributing to Henry's curtailed time by working in the basement while Henry attended to his classes on the main floor above. So indefatigable was Dr. Ten Eyck in collaboration with Henry that it would be negligence whenever speaking of the work of those days and the invention of the telegraph to omit his name; and though much thought in solving the wonderful problem came from the former, the doctor friend never uttered any detraction from the fame of Henry. The participation of Ten Eyck was so prominent and is made to appear so authentic from many sources that the two names must continue to be interwoven in the



JAR, WITH TINFOIL SPIRAL, USED BY HENRY TO PROVE THE INDUCTION OF THE STATIC DISCHARGE. PRINCETON MUSEUM.

telling of what was done. Dr. Ten Eyck was selected to take Prof. Henry's place when he resigned in November, 1832, to accept the professorship of natural philosophy in the College of New Jersey at Princeton.

"In 1837 Prof. Henry visited Europe, the object of this trip, as stated in his own words, being: 1. The formation of personal acquaintance with men of science which may be the basis of future correspondence on scientific subjects. 2. The study of the modes of instruction in science. 3. The methods of making original researches in the different branches of science. In short, to make such attainments as may be useful either in the way of my duties as an instructor or in reference to my own researches and which cannot be obtained from books.

"As I feel considerable strength on some subjects of science, I shall not be ashamed to show my ignorance on others by asking questions even of an elementary nature."

While in Europe he had many delightful interviews with Faraday, profitable and pleasurable conversations to both. With Wheatstone, who was then professor of experimental philosophy in King's College, he talked of magnetic circuits. In Paris he met Gay-Lussac, Arago, Biot, Becquerel, and De la Rive, and on his travels Dr. A. Dallas Bache (died 1867) proved a valued companion. Dr. Bache's father, Richard, was a son of the only daughter of Benjamin Franklin. At Paris Henry was unable to speak the language, but he met there, studying medicine in the Latin Quarter, Thomas Hun, M.D., of Albany (1808—June 3, 1896), whom he knew well at the Academy, and he acted as an interpreter. To this day it is quoted that Hun, although a prominent physician, was proud to style himself "Mouthpiece of his Majesty."

Henry was ever weighing his moments, that he might yield the greatest profit to science. Strangely indeed, while he knew he had remarkable ability, it cannot be pointed out that he ever so declared himself vauntingly.

He was obliged to earn a livelihood, and this he considered as a millstone. It was, during the early years of his life, like so much work before play, his play being deeper work than ever. When new positions were offered to him, he did not think what advancement in fame attached to them or what the financial gain might be, but only how much time he would have for his precious researches after he had each day fulfilled the quota of work to supply the body with food. If the new position might place him in ease, yet rob him of hours for scientific study, he could not see how he should better himself by accepting the offer.

Even at so youthful an age as

MAGNETIC APPARATUS MADE BY HENRY, NOW IN THE SMITHSONIAN INSTITUTION.

that of his election to fill the chair of Natural Philosophy at Princeton (November, 1832, aged 35), he was regarded as the leading man of science in America. Prof. Benjamin Silliman, of Yale, in urging his appointment wrote: "Henry has no superior among the scientific men of the country;" and Prof. James Renwick, of Columbia, added: "He has no equal." It is needless to say his election was unanimous and Princeton was the gainer. So varied was his learning that in 1833, while Dr. Torrey was in Europe, Prof. Henry filled his chair of chemistry, mineralogy and geology, and subsequently he lectured on astronomy and architecture.

Here he even found time to make researches in the college laboratory, constructing an original form of galvanic battery, so arranged as to bring into action any desired number of elements, from a single pair to eighty-eight.

His studies brought about discoveries in electrical self-induction, combined circuits, oscillation of electrical discharge, on "a simple method of protecting from lightning, buildings covered with metallic roofs," molecular physics, simple forms of heliostat, phosphorogenic emanation, relative heat-radiating power of solar spots, phenomena of fluorescence, electricity obtained from a small ball filled with water and heated by a lamp, new method of determining the velocity of projectiles, sonorous flames passing into a stove pipe, flow of water jets under varying conditions, relative angle of vision formed by a moving body, organic dynamics, derivation of species and affiliation of specific forms, limit of perceptibility of a direct and reflected sound, the thermal telescope, electric engine, which was the forerunner of the great principle we now enjoy so extensively in the motors of various kinds.

The Act of Congress, approved August 10, 1846, established the Smithsonian Institution for promotion of science, employing the liberal bequest of James Smithson, of London. Henry was made its first secretary, December 3, 1846, and actual director. He was afraid that his duty to the Institution would prevent him from making further research as at Princeton, and he questioned whether: "If I go, I shall probably exchange permanent fame for transient reputation," meaning that fame signified material gain for the scientific world. But he found the work so compatible with his ideas that in 1847 he declined a call to the Professorship of Chemistry in the Medical Department of the University of Pennsylvania, despite the urging of his friend Dr. Robert Hare and the salary, more than double that he was receiving at Washington.

He brought his scientific service to the use of the light-house board, geological, meteorological departments, and aided in establishing observatories. How he could find the time, it is hard to say.

Late in life (1875–77) as chairman of the committee of experiments of the United States Light-House Board, he conducted half a hundred experiments, and some of the nature that reasonably lead one to suppose that had he continued to live a little longer, he, with his mind well furnished with electrical data, would have given us the wireless telegraph. Through his efforts he secured to the government the free use of the Atlantic cable for transmission of important dispatches regarding astronomical discoveries, and the Royal Geographical Society passed a resolution of thanks in recognition of the good service. London also honored him in the "freedom of the city" on his visit, and three steamship companies asked the privilege of conferring free transportation.

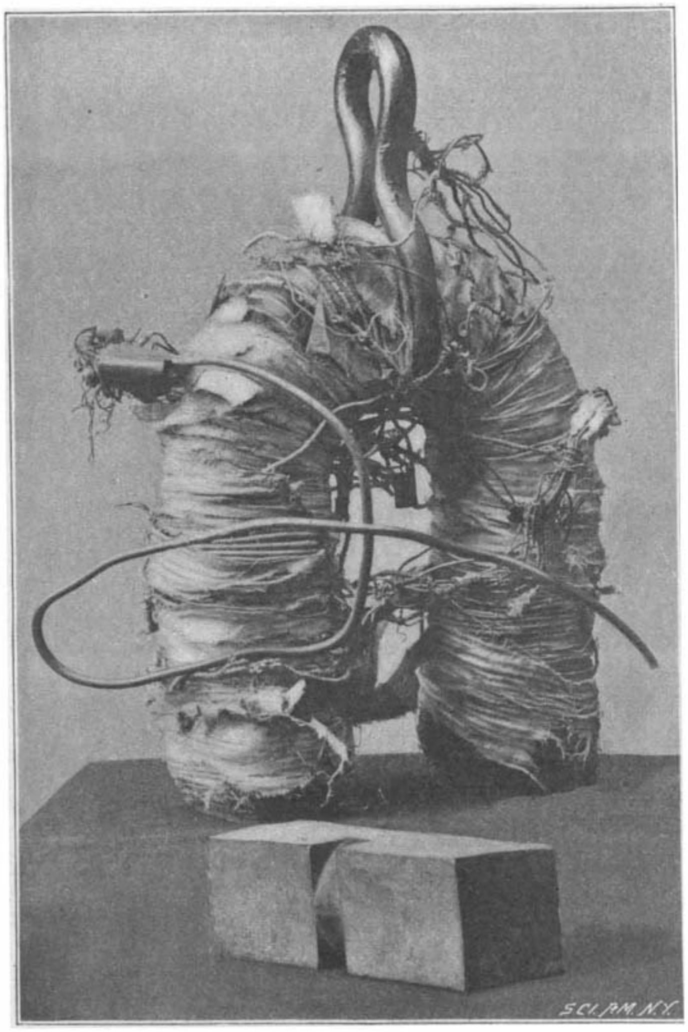
Joseph Henry died May 13, 1878. Fitting memorial exercises were held in the hall of the House of Representatives, Vice President Wheeler presiding, and addresses were given by several prominent men.

California Fig Culture.

Although California has often been called the land of the orange and the fig, there have been, in fact, very few figs grown in the State, and these have been of a poor quality. According to The New York Evening Post, from which we glean our facts, more than sixty varieties have been, from time to time, introduced from various parts of the world and carefully nurtured and planted at the experiment stations, only to demonstrate that they would not bear in the United States, or at least in California. Only the White Adriatic and the Black Mission are relied upon to produce crops. The Mission fig, like the Mission grape, was introduced from Spain by the early Franciscan friars, and their successors have been able to add only one species to the fig culture in California, and that is the White Adriatic. Neither of these figs is very satisfactory, and they do not offer much competition to the Smyrna fig, the importations of which amount to $2,000,000 per annum in value. Cuttings of Smyrna figs were brought into the State direct from Smyrna in the latter part of the eighties, and the cultivation of the fig was attempted without the aid of the fly called "blastophaga," which assists in the maturing of the figs.

The fig industry continued to be a failure until the Agricultural Department at Washington sent Mr. Walter T. Swingle to the countries bordering on the Mediterranean to look up the industry to see what was needed to make a success in California. He came to the conclusion that the blastophaga was the true means for the successful cultivation of figs, and he sent some 300 caprifigs (the uncultivated male fig) each fruit containing many of the blastophaga. They were wrapped in ten different packages of thirty each and were sent at different seasons of the year. Most of these shipments arrived safely at a fig ranch in Fresno and were at once hung up on various fig trees. In due time the flies hatched out and proceeded to enter the Smyrna figs, or rather the figs on the trees grown from cuttings which were imported from Smyrna. The result is there will be this year for the first time in the history of the State, a full crop of Smyrna figs. The caprification is necessary to the maturing of the fig, as can be proved. At Smyrna the people gather the caprifigs, which grow wild in the mountains, and attaching sticks to them throw them among the foliage of the trees, the sticks lodging in the branches and holding the caprifigs among the fruit.

The principle involved is very simple. The fig flower depends upon insects to fertilize it, as do a



"INTENSITY" MAGNET MADE BY HENRY IN 1829 TO DEMONSTRATE TELEGRAPHIC TRANSMISSION. PRINCETON UNIVERSITY MUSEUM.

number of others, among them being the orchid. The fig itself is a sort of a pot of seeds, and flowers, the flowers growing internally. In the Smyrna and in all other edible figs, the flowers are female, and do not secrete any pollen.

The caprifig is of a doubtful status. Some botanists regard it as the male tree of the fig, while others declare it is not only an entirely distinct species from any female fig-tree known, but the probabilities are that it is of a different genus. However this may be, its flowers are all male—that is, all of its flowers that the blastophaga permits to come to maturity. This fly enters the fruit when the latter is very small, and deposits its eggs in the flowers closest to the stem, filling the rows with eggs as high up as the center of the receptacle. When maturity is reached, the flies are ready to emerge, and the large end of the fruit being then slightly opened, they make their way out of the fig through that orifice.

When the insect passes up—or rather down—through the stamens of the male flowers, her hairy coat becomes loaded with the pollen which the anthers emit. With this she flies out, and, becoming herself ready to deposit, she seeks a new fig, and either entering it through a natural breech or boring her way in, she seeks the flowers in which to insert her eggs. Once in the fig the blastophaga never gets out, but dies there, and is eaten by the eater of the fig. One fly finds the cells in which it deposits none too numerous, for it lays about three thousand eggs.

This branch of the industry opens many important questions. Would different varieties of the caprifig impart to the edible fig different flavors? What varieties of the caprifig go with particular varieties of the edible fig, etc.? The trees are extremely hardy, and no horticultural industry in the State would be more profitable than fig raising if it could be made a success. There are about seventy-five known varieties of the caprifig. Only a few of these are in California. As rapidly as possible the flies are being acclimated, and they will be spread broadcast over the State, being placed upon ranches. By this means, if the colony in one part of the State should be destroyed, a new supply could be had.

The Scientific American Supplement.

Now that the subscriptions of many of our patrons are expiring, we wish to call attention to the advantages which our readers will secure by reading the SCIENTIFIC AMERICAN SUPPLEMENT. This journal was founded in 1876, with a view to giving an opportunity for the publication of many long articles, working drawings, notes, sketches of travel and exploration, etc., which could find no place in the SCIENTIFIC AMERICAN proper, and while both these papers are entirely distinct, one is truly the complement of the other, and those who receive both papers can be assured of keeping in close touch with what is going on in the scientific world. The SUPPLEMENT publishes each year 2,500 articles and notes varying in length from a few lines to many columns. These articles are illustrated each year by over 1,300 illustrations. One of the most valuable features of this unique periodical is the series of lectures and addresses which are given both at home and abroad. A stenographer with scientific training attends many of the most important lectures which are delivered in the United States, and makes careful stenographic reports exclusively for the SCIENTIFIC AMERICAN SUPPLEMENT, which reports are in turn revised by the lecturers themselves, and, when necessary, are adequately illustrated from sources available only to the authors. These lectures are published weekly during the season, and in the present year no less than 140 addresses have been printed in the SUPPLEMENT, many of them being illustrated. It should be remembered that there is a certain class of literature which does not get into book form for many years; we refer exactly to the kind of information which is given in these lectures. The professors and scientific men who give the lectures do not have time for book writing, and for this reason the value of these lectures, which represent their best thoughts and efforts, will be patent to all. The shorter notes are selected with particular reference to the needs of the readers of the SUPPLEMENT and are on all subjects. A column of "Selected Formulæ" gives directions for making modern preparations of all kinds and is a most valuable feature. "Trade News and Notes" is a column of selections from German technical papers which are exclusively published in the SUPPLEMENT. A page of Trade Suggestions from United States Consuls enables the readers of this paper to be kept informed of the condition and wants of trade all over the world, and the reports are published almost as soon as the daily "advance sheets" from which they are compiled. A specimen copy of the SUPPLEMENT will be sent free on application to any of our readers who may be unfamiliar with this periodical, and those who have already subscribed to the SCIENTIFIC AMERICAN can obtain the SUPPLEMENT at reduced rates by subscribing immediately.

Electric Railroad Cars in Belgium.

A series of tests have recently been carried out in Belgium in order to demonstrate the practicability of electrically-propelled cars on the railroad lines of that country. The tests have been carried out by the railroad administration on the lines radiating from Antwerp. There are at present five of these cars, which are of some length and carry 75 passengers, with first and second-class compartments. At each end of the car is a glass protected platform for the motorman. The accumulator system is used, and the car makes the distance from Antwerp to Brussels without recharging en route; the normal speed is 75 kilometers per hour. The cars are of an elegant pattern, and the construction is made as light as possible; they are divided into compartments by lateral partitions, according to the general European practice. These partitions are composed in the upper part of glass panes, so that the lighting of the car will be well distributed throughout. A powerful projector is carried in front, which illuminates the road for a distance of 150 meters. The administration, after a number of tests made under practical conditions, are satisfied with the system, and are preparing to double the number of cars in the near future.

THE Westinghouse Company is constructing at their East Pittsburg shops a 1,500 horse power gas engine. It is 27 feet high, 12 feet 4 inches wide, and 44 feet long.