DEPARTURE OF THE BALTIMORE FOR SWEDEN.

The imposing ceremonials which took place in this city August 23 last, in homage to the memory of the late Captain John Ericsson, were brought to a close by the final act of transferring the casket containing the precious remains to the decks of the war ship Baltimore. The scene is depicted in the illustration upon our first page. A procession of citizens, some six thousand in number, followed the hearse from the cemetery down Broadway to the Battery. It was a solemn and impressive spectacle. Among those in the line were the members of the American Society of Swedish Engineers, the American Society of Civil Engineers, the American Society of Mechanical Engineers, the Marine Society of New York, the workmen of the Delamater Iron Works, the Farragut Naval Veterans Association, lodges of Odd Fellows, marines, and officers, naval and military, of the United States.

The scene from the Battery, when the procession reached that point, was striking and animating. A fleet of national war vessels lay extended over the bay in a long line, the Baltimore at the head, while the adjacent waters were covered with steamers and vessels of every description, all crowded with spectators.

From the landing at the Battery the casket was conveyed on a small government steamer to the side of the Baltimore, and then reverently raised by tackle from the yard arm to the deck of the ship, the booming of minute guns on board the Ericsson monitor Nantucket being maintained throughout this solemn proceeding. The flag signals for sailing were soon after this displayed, the anchors were raised, and the stately Baltimore began her ocean voyage to Sweden. As she steamed slowly past the line of war vessels each one delivered its salute of twenty-one guns, and the same tokens of honor came from the embrasures of the various fortifications as the ship proceeded down the bay and went out to sea. John Ericsson was born in Sweden, July 31, 1803, and died in New York, March, 1889, at the age of nearly 86 years, of which about half a century was spent in this his adopted country. He was a man of wonderful intellect and remarkable achievements. His name is indissolubly connected with the early history of the locomotive and with the practical application of the propeller to ocean steamers. His great services to the people of this country in designing and realizing at a critical moment the turreted war vessel can never be forgotten.

THE NEW STATE HOUSE AT INDIANAPOLIS, IND.

INDIANAPOLIS MEETING OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

BY H. C. HOVEY.

Nineteen years ago the A. A. A. S. met in the city of Indianapolis. Since then its meetings have been scattered annually from Montreal to Minneapolis, and as far south as Nashville. Meanwhile great changes have taken place in all parts of the country, and nowhere have these been more marked than in the Hoosier State. One of the most agreeable and noticeable improvements is the State House itself, where the daily meetings of the Association have been held, from Aug. 19 to Sept. 1. Any one who ever saw the dingy old capitol, in whose halls we convened two decades ago, would appreciate the transformation that has been effected by a happy combination of money, brains, and integrity in using the finest building materials obtainable in constructing the capitol, magnificent in its dimensions and unsurpassed in the thoroughness and perfection of its construction. As this edifice is a model in its way, it may be well here to give some of the principal facts as they were stated to me by Prof. John Collett, to whom, together with Gen. T. A. Morris, Gen. John Love, Messrs. Nelson, Seward, and others associated with them as State House commissioners, are chiefly due the admirable results embodied in this form.

In the center of a park of nine acres, bounded by four broad avenues and located in the heart of a city of 125,000 inhabitants, rises a lofty and stately structure whose crowning glory it is that from its massive foundation to its gilded dome every foot of it is honest work, all paid for within the original appropriation made by a vote of the legislature. The length of the building is 500 ft., its width 283 ft., its height 235 ft., and the portico 100 ft. high. The style is Neo-Grac, with interludes of Victorian plainness. The foundation and solid walls laid in hydraulic cement are claimed to have strength enough to resist cyclonic or seismic action, and the building in every part is so absolutely fire proof as to dispense with the need of insurance.

The main material used is Indiana oolitic limestone, which contains 98 per cent carbonate of lime, and resists heat or cold from plus 100° to minus 30° F. Glacial tracks down to the finest hair lines remain upon its exposed surfaces unchanged during the centuries untold that have passed since they were made. It was all selected from the quarries of Monroe and Lawrence counties, Ind. The workable beds are from 10 to 100 feet thick and are easily cut by steam channeling machines. The stone is homogeneous, grayish white, with a density of 150 pounds per cu. ft. and a crushing weight from 10,000 to 26,000 pounds to the inch. Since its introduction into the State House the demand for it has increased a thousand fold, and the railroad facilities are insufficient to carry the burden. Specimens of this stone may be seen in some of the finest buildings on Wall Street, New York, in the Vanderbilt palace on Fifth Avenue, in some of the best buildings on Chestnut Street, Philadelphia, in the new State House at Atlanta, Ga., and the Cotton Exchange at New Orleans, whose outside statuary groups remain perfect where neither marble nor granite would endure. It is estimated that during the four years since the State House was completed it has paid for itself ten times over as an advertisement of the resources of the State, especially in the items of stone, lime, cement, and hard woods. The rooms are finished with white oak, quartered, no other kind being used in the building. The stone work throughout is dressed to faced edges, from ¼ to ½ inch joints, so there is no possibility of cracking, as occurred in the dome of the Connecticut capitol, which had to be filled with type metal to keep it from falling. Here the dome is as solid as the natural rock, and the commissioners defy any visitor to find the slightest crack or sign of settling in any portion of the immense structure. The granite foundation stones and numerous polished granite shafts were brought from Maine, the white marble for tablets and statuary from Vermont; the clouded and variegated marble for the columns for the magnificent colonnade, visible at one glance through three stories, are from Tennessee. Every block of stone in the building passed under the inspection of Prof. John Collett, who inexorably rejected whatever was suspicious or in any way objectionable. There is not a block of stone in the whole building taken from a quarry where either powder or dynamite had been used.

Begun in October, 1878, it was finished October, 1888, and has now been in constant use for four years, during which time not one dollar has been spent for alteration or repairs. The original appropriation was two million dollars. Costly substitutions were made as the work progressed, granite for brick, marble for limestone, solid oak for cheaper woods, and yet the total cost was but $1,980,969, thus coming considerably within the limit set. This unusual and honorable result is due to the integrity, skill, and fidelity of the commissioners.

Among the merits especially appreciated by the scientific visitors to the capitol may be mentioned its perfect water supply, perfect ventilation—enabling members to keep awake during the dullest discussions. The royal commissioner of Austria, in visiting this State House, remarked that in all his travels he had never seen a large public building, temple, or cathedral, that did not have many dark, dirty recesses; but he found here that the corridors were so lighted from immense skylights that every nook and corner was flooded with light: while every business room was, at some hour of the day, visited by sunshine. If undue space seems to have been given to the description of this spacious and commodious building, my excuse is that the Association was so delighted with it as to spend all their spare time either in admiration or praise; and much of the success of this meeting has been due to the fact that it was held in an edifice where there was room for all the sections within easy reach of each other and with every facility for carrying on their special sessions to advantage. The citizens of Indianapolis, moreover, were justly proud of their guests, and did everything in their power to make the meeting the most brilliant and enjoyable the body has ever held. When Lieut.-Governor Chase, in his hearty address of welcome, declared that for the occasion he put the 36,000 square miles of the commonwealth of Indiana at the disposal of the A. A. A. S., every citizen who heard him said amen. The meeting for organization and welcome was held in the Hall of Representatives, with several hundred members of the A. A. A. S. present, besides a sufficient number of citizens to occupy every seat and overflow into the lobby. The opening prayer was offered by Dr. Van Anda, after which the retiring president, Prof. T. C. Mendenhall, resigned the chair to Prof. G. L. Goodale of Harvard. Dr. G. W. Sloan, in behalf of the local reception committee, made brief remarks, and introduced Lieut.-Gov. Chase and Mayor Sullivan, who welcomed the Association in behalf of the State and city.

After the general session, addresses were made by the vice-presidents before their several sections. In section "A" Prof. S. S. Chandler made an address in regard to the community of nature between the variable stars and the other stars of our sidereal system; their number, size, color, and fluctuations of brightness. In section "B" Prof. Abbe urged a broader study of terrestrial physics, as distinguished from the line of molecular physics, to develop which many laboratories and professorships have been established. Under the general head of geo-physics he would include vulcanology (the study of interior depths), geogomy (the study of the earth's crust), magnetism, the aurora borealis, gravitation, attraction, oceanic waves, currents and tides, seismology, and meteorology. In section "C" Prof. R. B. Warder spoke on recent theories of "Geometrical Isomerism," illustrating his paper by models and diagrams to explain the campaign that is being carried on against the stronghold of atomic mysteries. In section "D" Prof. J. C. Denton, of Hoboken, N. J., gave a very interesting history of "Attempts to Determine the Relative Value of Lubricants by Mechanical Tests." He illustrated, in a unique manner, by means of the stereopticon, experiments with crude and refined oils in their effect upon the rubbing of wearing surfaces; and in explanation of the paradox that overheated journals may be relieved by applying sand or emery to the bearings. In section "E" Prof. J. C. Branner spoke at great length on the "Relations of State and National Geological Surveys;" which as he claimed should stimulate each other and encourage private enterprise and investigation. With a splendid equipment of men and means, the respective work of the various surveys ought to be more sharply defined to prevent a waste of effort. As it now is, much geological literature is practically worthless, being an incumbrance rather than a help. Many errors and annoyances might be prevented by skillful and cordial co-operation. He made a special plea for utilizing local talent, even of a non-professional sort, under the direction of competent conductors. In section "F" Prof. Minot treated a subject of special interest to biologists, "The Phenomena of Old Age." He entered on a large field of statistical inquiry, with hints as to how it might be worked, and its materials made to yield valuable results. He made the singular statement that there is, scientifically speaking, no period of vital development, but only a steady decline from birth onward. There is much to be done in the domain of biology to solve the problems of reproduction, heredity, sex, growth, variation, death, and the general economy of nature, in order to explain the phenomena under consideration.

In the section of economic science and statistics, Hon. J. R. Dodge delivered a very careful and original address on the American standard of living and the advantages enjoyed by the producing classes of the

United States. He spoke of the wasteful use of food in this country as compared to other countries of the world, the profuse supply of clothing, the constantly increasing demand for the adornment of the home, the alleged depression of the agricultural class, which he considered to be greatly exaggerated, as he did also the unfortunate statements made in regard to farm mortgages and their relation to independence and prosperity. He treated also on the growing demand for a higher education, which, he said, was too often linked with a distaste for useful industry. In view of all these things comes the question, "Shall the present manner of living be maintained, and with it the constant increase in wages demanded by the American people?"

In the anthropological section Dr. Frank Baker, of Washington, D. C., gave his views "In Regard to the Ascent of Man." By this he meant the effort of the human being to assume an erect position from one that had previously been semi-erect. He regarded the struggle as still going on, and as serving to explain the liability of man to certain deformities and diseases from which quadrupeds are exempt.

The races of men and the anthropoids sprang from a common stock, as he thinks, far back in prehistoric night; though each being, in its own way, has fought the struggle for existence. The results of the erect position are so great as to affect the whole life of man, controlling his habits, directing his actions in war, the chase, and society, and, finally, moulding peoples, nations and races.

Correspondence.

Cutting Glass Bottles.

To the Editor of the Scientific American:

I have seen three different modes of cutting glass bottles described in your valuable paper, and do not doubt they are practicable. Yet I should like to mention a very simple and easy way, which I have tried several times without failing. Saturate a piece of cotton string in kerosene (alcohol, benzine, etc., will, I suppose, answer just the same), tie it around the bottle as close as possible and apply a match. By holding the bottle in a horizontal position with both hands, it can be turned slowly, allowing the fire to burn round. If the glass does not crack immediately after the flame is extinguished, let the water from the hydrant drip on it, and the cut is clear and even. Smooth the sharp edges with a file.

Chicago, Ill. CHRISTIAN KOCH.

Work of Amateur Electricians.

To the Editor of the Scientific American:

I have made simple electric motor described in SCIENTIFIC AMERICAN SUPPLEMENT, No. 641, with a few changes. Made the commutator and brush holders same as they are made by electric companies. The bearings of brass, and bolted them to the sides of field magnet, which is of solid iron. Use the Thomson-Houston incandescent current. Use the motor to run novel window displays during the holidays. Have made a working telephone, also described in one of your SUPPLEMENTS, and am now making a phonograph. H. C. ALBRECHT.

Terre Haute, August 19, 1890.

To the Editor of the Scientific American:

Seeing in your issue of SCIENTIFIC AMERICAN, July 19, a request that the amateur electrical workers report, I will state that I have read SUPPLEMENT Nos. 161, 599, and 600, and have made a dynamo of the same size as the one described in SUPPLEMENT, No. 161, but I improved it according to the two other articles. I had the field magnets cast in the same shape as those of the eight-light dynamo. It has a Siemens armature, made with washers of wrought iron as a core, and having twelve coils of No. 20 wire, each coil having about 20½ feet of wire in it. The commutator is made of large copper wire, flattened into bars, mounted on a hardwood cylinder, and held in place by two brass bands, one at each end. The bands are separated from the bars by pieces of tape, and each bar is separated from the others by pieces of shellacked walnut wood. The fields are wound with four parallel No. 18 wires, which can also be connected in series similar to the eight-light dynamo. It works better as a shunt machine running the field coils in series.

With the dynamo I can run two six-candle Edison lamps, in parallel or series; but it takes a very high speed to run them in series, from which I conclude that the voltage must be from 16 to 22, according to the speed. The lamps require 10½ volts. I can produce strong shocks, run small motors, charge accumulators, produce a small arc light, and heat an inch or more of No. 30 iron wire white hot. I have added to the field coils four layers of No. 20 wire, which I run in parallel with the No. 18, and find that I can produce the same results with a much lower speed. I have learned a great deal about electricity since I subscribed for the SCIENTIFIC AMERICAN, about eight months ago. I shall probably make a larger dynamo next winter. C. F. KELLOGG.

Prairie Center, Ill., August 21, 1890.

To the Editor of the Scientific American:

I noticed your request to electrical workers in the July 19 issue, and will tell of my experience in making an induction coil according to the instructions in SUPPLEMENT, No. 160.

My first attempt was with bare wire in the secondary coil, and as I had no engine lathe to secure uniform spacing of the wire, I tried to space by the aid of a comb with the teeth cut very short. The result was anything but satisfactory, and led to the construction of a new secondary coil, using silk-covered wire. Winding each layer the full length of the coil, and then giving it two coats of shellac varnish, then over each layer of wire was wrapped two layers of common manila wrapping paper and another coat of shellac applied.

The coil was finally completed and mounted on its base with commutator and everything complete, a battery was attached and the current breaker buzzed like a bumble bee, but no spark could be obtained, though an accidental contact with the poles with bare hands showed that the induced current was there, and much too strong to pass through any one's system with safety.

Here was a dilemma, something was wrong, and letters to various authors of text books on electricity gave no way out of the difficulty.

In the course of a week or more a spark, perhaps the thirty-second of an inch in length, could be obtained between the poles, and in the course of a week more increased in length to perhaps one-eighth inch.

This was encouraging, but not satisfactory, and a new coil was determined on. This time I used silk-covered wire, but wound the coil in two sections, as described in the SUPPLEMENT, using no shellac. The space between the sections was filled with a piece of walnut made into a ring. This was split and boiled in paraffine wax to insure its insulating qualities. The two halves were then fastened together by means of screws. I used only one pound of wire in the secondary coil.

This coil when completed was a success, giving with a battery of four cells a spark from three-quarters to an inch in length.

This coil was constructed some eight years ago, and afterward sold to the high school at Tecumseh in this State, where it is still in use.

The failure of the shellacked coil was a source of much perplexity to me then, and I am not positive that I can explain it yet, but I have been informed that shellac varnish, while apparently dry in a few hours, is not sufficiently dry to serve as a complete insulator, and requires weeks to become so, and had I placed the coil in a dry room for three months, it would then have acted satisfactorily. I believe there is some truth in this, and it may aid some other amateur perplexed as I was. E. A. CONDIT.

Morenci, Mich., August 23, 1890.

The English Hop Industry.

A report has been issued by the Select Committee of Parliament appointed to "inquire into the causes which have produced the steady decrease in the acreage of land under hop cultivation, and the serious displacement of labor occasioned thereby, and to report as to the best means, if any, of providing a remedy." We abstract the following:

In the wealds of Kent and Sussex and in Mid-Kent the decrease of hop cultivation has been very serious, namely, from 43,400 acres to 31,900 acres, or 26 per cent, and there can be no doubt that, having regard to the great amount of capital outlay necessary for bringing hop land into cultivation, and for providing the necessary buildings, and to the yearly expenditure on labor for cultivating and picking the hops, this great reduction in the area under cultivation has told with exceptional severity on all classes in these districts.

From the evidence received it appears that the best qualities of hops are grown in East Kent and in parts of Mid-Kent, then come the Farnham, the Herefordshire, and Worcestershire hops, the last two of which have grown greatly in favor the last few years, and lastly come those of the wealds of Sussex and Kent, where hops abundant in quantity but of less value in quality are grown. The decrease of cultivation, therefore, has occurred mainly in those districts where hops of inferior quality are produced, and it is from these districts mainly that complaints have been made to the committee.

The immediate cause of the decrease is owing to the very low prices which have ruled for hops during the last few years.

The great majority of witnesses engaged in the cultivation of hops attribute this fall of price mainly, if not wholly, to foreign imports. They allege that the price of foreign hops rules the market for English hops, and that foreign hops have largely supplanted English hops in the home consumption. The greater number of these witnesses favor the imposition of a duty on foreign hops to the amount of 30s. or more per cwt. By some it is suggested that this duty should be accompanied by a tax of £1 per acre under cultivation of hops in England. This, however, was objected to by the great majority of witnesses. The proposal, therefore, is practically one for a protective duty on hops. But the committee cannot recommend the imposition of a duty upon foreign hops.

All the evidence shows that cultivation of hops was carried on with profit previous to 1879, the import of foreign hops during this period was large, but in spite of this the area of cultivation rose from 56,000 acres in 1866 to 71,700 acres in 1878. It is evident, therefore, that the recent depression is due to other causes besides foreign competition.

From the evidence and statistics laid before your committee, there is reason to conclude that those causes have been—(1) the reduced consumption of malt and sugar for brewing purposes, and consequently of hops since 1879, owing to the depression of trade and other causes; (2) the economy effected in the use of hops in proportion to malt since the year 1882, owing to the more scientific manufacture of beer and to the altered taste of the public, which has required a beer of lighter and brighter character; (3) the use to a certain degree of hop substitutes.

The evidence further shows that there has been a considerable economy in the use of hops since the year 1882. The very high price of hops in that year induced brewers to turn their attention more closely to the subject, and science was brought in aid of the manufacture of beer. It was found possible by the use of ice to brew continuously throughout the year, the consumption of beer became more rapid, it was no longer necessary to keep large stocks of beer for many months, the taste of the public altered, a brighter quality of beer, less heavily hopped, is now preferred. As a result of these changes, the proportion of hops used to a quarter of malt has been reduced to an amount estimated generally at 1½ pound per quarter of malt, or 15 per cent. When there is added to this the reduction due to a reduced consumption of malt, estimated at 12 per cent, the two together account for a largely reduced demand, and consequently for a fall of prices. It was to be expected, therefore, that there would be a reduced cultivation of hops corresponding to the increased cultivation in the decade prior to 1878.

The change which has taken place in the quality of beer, and the increased demand for a lighter and brighter beer, has also told mainly on the inferior qualities of hops, for the better qualities alone can be used for beer of this kind, and it has consequently followed that the reduced demand has mainly affected those districts where the inferior qualities of hops have been grown. The evidence shows that the same causes have led, in many parts of the Continent, to a reduced cultivation during the last few years of much land where inferior hops were grown.

It is confidently stated that none of the so-called substitutes can be relied upon to perform the work of hops in the manufacture, flavor, and keeping of beer. The use of hops is represented to be fourfold—first, to precipitate or render insoluble certain nitrogeneous ingredients of the wort; secondly, to preserve the beer by preventing a renewal of fermentation during the time before it is fit for consumption; thirdly, to give it the bitter taste to which the public have become accustomed; fourthly, to give it a delicate aroma.

None of the various drugs which are advertised as substitutes for hops performs any of these functions except the third, that of giving a bitter taste to the beer. It is admitted generally that it is impossible to make beer such as the public requires without hops, and that at most the drugs referred to can only be used as substitutes for a small proportion of the hops which would otherwise be used. It is alleged that none of the larger and better class of brewers makes use of any of these substitutes.

Electric Light in the Suez Canal.

The number of vessels passing through the Suez Canal at night by means of electric light is increasing with extraordinary rapidity. The regulations for the use of the electric light came into operation in March, 1887, and during the remainder of that year (according to statistics given in the recent British consular report from Port Said) the number using it was 394. In 1888 the number rose to 1,611, and last year reached 2,445. Prior to March, 1887, the privilege of traveling by night with electric light had been restricted to vessels carrying the mails. Since then all ships which conform to the regulations are allowed to proceed by night. The average time of transit has also been considerably shortened. In 1886 it was 36 hours; in 1887, 33 hours and 58 minutes; in 1888, 31 hours and 15 minutes; and in 1889 it had been reduced to 25 hours 50 minutes. The average time for vessels using the electric light in 1889 was 22½ hours. The shortest time taken by a steamer in the transit of the canal in 1889 was 14¾ hours, which is ten minutes less than the fastest passage on record previously.