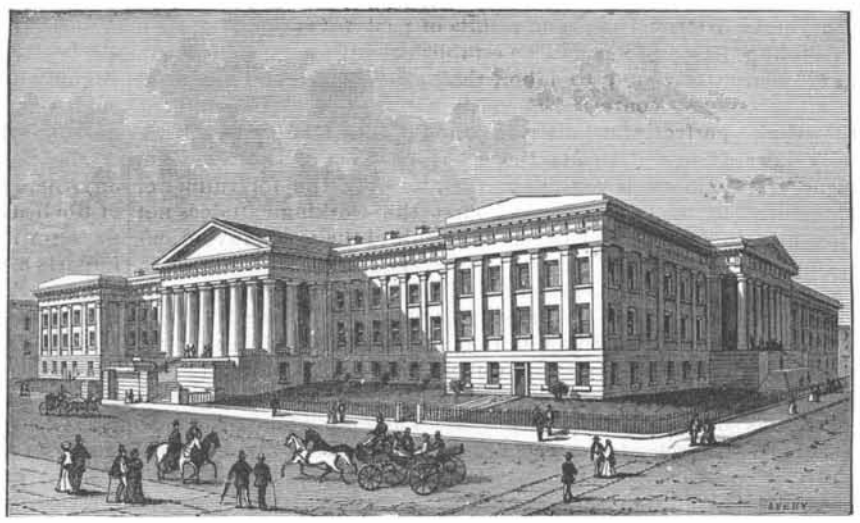
THE PATENT CENTENNIAL CELEBRATION—APRIL 8, 9, AND 10.

The notable group of eminent men assembled on the stage of Lincoln Music Hall, Washington, on the afternoon of April 8, at the opening ceremonies of the centennial celebration of the American patent system, formed a picture which will live while memory lasts in the minds of all who were fortunate enough to be present, and one to which the brush or pencil of the artist and delineator can at best do but feeble justice. Our sketch of the inspiring scene will convey to scores of thousands, keenly appreciative of the significance of the occasion, some idea of its dignity and stateliness. The exercises were formally opened with a short address by the President of the United States, and this was the moment chosen by our artist for his view of the Congress of Inventors and Manufacturers of Inventions, which appears on the first page of this issue, and the business of which was continued through the afternoons and evenings of three days, April 8, 9, and 10.

In the group immediately behind and at the side of President Harrison were the Hon. John W. Noble, Secretary of the Interior; the Hon. Charles E. Mitchell, Commissioner of Patents; the Hon. Samuel Blatchford, Justice of the United States Supreme Court; Hon. John W. Lynch, Chairman of the Executive Committee; Hon. O. H. Platt, of Connecticut, U. S. Senator; Postmaster-General Wanamaker; Carroll D. Wright, the Commissioner of Labor, and as many others as the stage would comfortably hold, all being representatives of the highest types of the progressive spirit of modern times. The audience, too, was almost entirely composed of men who had attained eminence in some department of life connected with the origination or development of inventions.

In opening the congress the President expressed his appreciation of the importance of the occasion, and hoped the gathering would be promotive of science and art. He thought it distinctly marked a great step in the progress of civilization when the law takes notice of property in the fruit of the mind. The ownership in the clumsy device which savage hands have fashioned from wood and stone is obvious to the savage mind; but it required a long period to bring the public to a realization of the fact that it was quite as essential that this property in impalpable thought, taking the shape of things useful to men, should also be recognized and secured. That was the work of the patent system as it has been established in this country. It could not be doubted by any, he thought, that the security of property in inventions was essential and highly promotive of the advance of our country in the arts and sciences. Nothing more stimulated effort than security in the result of effort.

After the President's remarks, Rev. Dr. Sunderland invoked the divine blessing, and then Secretary Noble introduced Commissioner Mitchell, who spoke on "The Birth and Growth of the American Patent System."



THE UNITED STATES PATENT OFFICE, AT WASHINGTON.

MODEL HALL, UNITED STATES PATENT OFFICE.

The patent system, said Commissioner Mitchell, had its birth in a statute against monopolies. That statute was enacted by a British parliament to sustain the British throne. From the earliest times the right to grant exclusive privileges had been asserted as a royal prerogative. Sometimes the power had been exercised beneficently. With vastly more frequency it was employed to bring in revenue to the royal coffers, more and more as the sovereign struggled to govern without the aid of parliament. The power was abused and perverted until in the days of Elizabeth monopolies were conferred upon favorites of the court, extending to the most ordinary articles of commerce and consumption. In aid of these illegal monopolies, arbitrary powers of search were granted, and heavy penalties were inflicted upon English merchants for engaging in occupations which had been of common right for centuries. Of course such tyranny could not continue, and in the year 1623 the famous statute of James was enacted, destroying all illegal monopolies by a single stroke, and declaring that in future all patents should be to inventors of new manufactures, and to them only for a limited time. It is to this statute that legal writers ascribe the modern patent system.

But although the patent system is ascribed to the statute of 1623, its administration was long pervaded by a spirit hostile to inventors. The benefactor of the public had to crawl before the king as a suppliant for favor. If his cringing was successful, his patent was granted, but he was dismissed with the poor privilege of proving the novelty of his invention as best he could. The patent was not even *prima facie* evidence that the patentee had made an invention. When it came into court, it was construed in a technical spirit, a spirit which assumed everything in favor of the crown and nothing in favor of the subject, and it is hardly too much to say that some of the earlier decisions in patent causes betray a temper that would have better befitted a permit to sell gunpowder in the streets of London. In view of this judicial hostility, which robbed the law of its beneficence and transformed the statute into an ambuscade, it is no wonder that for a hundred and fifty years scarcely more than one thousand patents were granted. It could make but little difference whether patents were denied or, having been granted, were denied protection.

But a more enlightened sentiment developed. Watt had harnessed machinery to steam and Arkwright had harnessed spinning to machinery. The patent to Watt, granted in 1769, had been extended by an act of parliament in 1775 and had run unscathed the gauntlet of the judge. Patents were granted with increasing frequency, and the useful art received a mighty impetus. Powerful infringers sought to trample upon the rights of patentees, and law suits followed that were fierce as battle fields. Judges began to regard inventors, not as recipients of royal favor, but as public benefactors worthy of the world's great prizes. Then came those days, memorable in judicial annals, when jurists who were in touch with human progress discussed anew the relationship of the inventor to the public, and, as if they had gotten foregleams of a new industrial era, laid down those broader and more generous principles which have become the foundation and framework of the patent law. The statute of James followed the Mayflower across the ocean. In the year 1641 the General Court of Massachusetts Bay granted a patent to Samuel Winslow for a method of making salt, and prohibited others from making this article except in a manner different from his. In 1646 a patent was granted to Joseph Jenks for an engine for the more speedy cutting of grass, the invention substituting for the short and clumsy English scythe a long, slender blade, supported by a rib along its back—a construction easily recognized as that of the modern scythe. The invention seems also to have extended to machinery for scythe making.

The name of Joseph Jenks—how inconsiderable the place which it occupies in colonial history! The antiquarian stumbles upon it and makes a memorandum in his note book, while the student of events that thrill and startle passes it without a thought or utterance. Nevertheless, a deep human interest invests it, and more and more it shall attract attention. Nor do we honor him less because the mowing machine and the reaper have eclipsed in brilliancy his more humble achievement, as there in the early wilderness he appeals to the general court for protection, so that, as he quaintly says, "his study and cost may not be vayne or lost."

Mr. Mitchell referred to patents issued by the colonies of Connecticut, Maryland and New York, showing, as he said, how deep-seated was the understanding, wherever the law of England had been inherited, that it was a just and beneficent exercise of the power of governments to protect inventors by patents for limited periods. The constitutional convention at Philadelphia had been in session nearly three months before its attention was directed to patents and copyrights. Mr. Mitchell then detailed the propositions brought in by Mr. Madison and Mr. Charles Pinckney, which resulted in paragraph 8 of section 8 of article 1 of the Federal Constitution. "Wise and illustrious men were they, these constitution framers," the speaker said, "but they had no conception of the importance of what they did when, just before the curtain fell upon their labors, they decreed that the exclusive rights of inventors should be secured. They thought they were applying finishing strokes and touches to an edifice which was otherwise completed, when they were really at work upon its broad foundations. For who is bold enough to say that the Constitution could have overspread a continent if the growth of invention and of inventive achievement had not kept pace with territorial expansion? It is invention which has brought the Pacific Ocean to the Alleghanies. It is invention which, fostered by a single sentence of their immortal work, has made it possible for the flag of one republic to carry more than forty symbolic stars."

The speaker then detailed the circumstances attending the passage of the first patent law of April 10, 1790. Under that law the Secretary of State, Secretary of War and the Attorney-General were to determine in each case whether a patent should be granted. From April to July they awaited a successful applicant. He comes at last, and three cabinet officers, Jefferson, Knox, and Randolph, sitting in solemn dignity, determine that Samuel Hopkins is entitled to a patent for his new method of making pot and pearl ashes.

"Does any one," Mr. Mitchell went on, "say that the office then discharged was unworthy of such a tribunal? Let him remember that patent of July 31, 1790, was the first of 450,000 patents. Let him try to imagine the condition of life and society if those patents had never been granted. Let him ask himself what adequate reason exists for the wizard-like transformations of a century, excepting the stimulus afforded by patent legislation. Let him compare the saddle and the pillion with the parlor car, the tallow dip with the electric light, the post boy with the lightning mail, the telegraph and the speaking telephone. Let him make a corresponding comparison in every department of life, along every line of progress, and he will see in the signing of that patent to Samuel Hopkins an act of historic grandeur." Fifty-seven patents in all were granted under the statute of 1790. A new act was passed February 21, 1793, which law prevailed, with some modifications, until the great law of 1836 was enacted.

"The act of 1836," said the speaker, "created an epoch. An eminent statesman has pronounced it the most important event from the Constitution to the civil war. Less than 10,000 patents precede it, more than 450,000 have followed in its train. Under it the Patent Office was established. Under it the first commissioner of patents was appointed, and hardly had the approving signature of Andrew Jackson been affixed before the walls of yonder Doric temple, already completed in design, began to rise. The most important change brought about by the act of 1836 was the restoration of the examination system and the establishment of an examining corps of experts. The English system, developed on executive lines, relegated all investigation to the courts; the American plan, developed on legislative lines, made the investigation precede the grant. The law of 1790 followed the American trend developed in the colonies, and Jefferson and his associates formed an examining board. Then came the act of 1793, which avowedly imitated the English system and permitted a patent to be issued to any one who should allege that he had made an invention, and should make oath that he believed himself to be the true inventor.

"The act of 1836 restored the American system. The Patent Office was vested with quasi-judicial as well as with executive functions, the patent being adjudicated upon in advance, and possessing, as soon as it was granted, the attributes of a patent, which, under the old system, had been tested by expensive litigation. The importance to inventors of the system of preliminary examination has been declared to be inestimable. It places at the service of the humblest inventor the services of trained experts in law and mechanics. It

makes the patent something more than an assertion of right, something more than a challenge to the world to show that the patentee was not the true inventor. It bears testimony that it has been compared with prior patents and publications, domestic and foreign, and with all that has been done in the United States, as far as known, and that the device or process claimed is what it professes to be—a new departure in the arts. Thus the patent acquires an immediate commercial value—a value which is enhanced just in proportion as means are supplied by the government for making an inquiry as complete and exhaustive as it is in human power to make it."

The speaker gave a brief sketch of John Ruggles, the Senator from Maine, the author of the act of 1836. The speaker referred to other laws since passed which had modified in some details the statute of 1836. In 1861 the term of a patent was extended from fourteen to seventeen years. In 1870 the laws were consolidated, and when the laws of the United States were revised in 1875, the act of 1870 was re-enacted without substantial change. All the statutes since the law of 1836 have been in substantial accord with the policy inaugurated by that act, and have had for their object to carry that policy into effect, with such modifications as experience has shown to be necessary. During 1790 three patents were granted; during 1890 the number was 26 292. In 1790 the receipts were about $15; in 1890 they were $1,340,372.60. In 1790 the work could only have required the infrequent services of a single clerk; and in 1890 the number of employes, including the examining, clerical and laboring force, was 590 men and women.

"The growth of the patent system," said the speaker, "has been brought about by the friendly laws which I have mentioned exercising their influence for the most part in four different channels.

"1. The patent system has stimulated inventive thought. Benjamin Franklin, a man of science, stood by the side of the old hand-lever printing press for a generation and left it where it was left three centuries before by Gutenberg. It remained for Hoe and other inventors who worked under the stimulus of the patent laws and patented their inventions to produce that marvelous machine for disseminating knowledge that has made the world a university. A century ago the apprentice learned the skill and secrets of his craft and jogged along contented with his acquirements. Today no workman expects to leave his craft or calling without lifting it to a higher plane and providing it with better instrumentalities. A new power of achievement has come into human thinking. Men of all callings seem to have acquired the faculty, and no explanation of the change is even plausible which ignores the stimulating influence of a century of patent law.

"2. The patent system has stimulated men to transform their thinking into things. It is a long and toilsome road from the first fugitive suggestion through failure and discouragement and temporary defeat to an invention in a form perfected. If men were not induced by the rewards of a patent system to cling to their new ideas through all the vicissitudes of an inventor's experience, their hands would drop in discouragement. The story of the lost arts has never been told, even by Wendell Phillips, and decades and centuries of possible progress have been wrapped up in inventions which have dawned upon the human consciousness only to disappear and be forgotten.

"3. The patent system encourages men to disclose their inventions. The duty of men to disclose their discoveries is one which, if it exists at all, has never been recognized. It is not so, however, when patent laws prevail, and for a hundred years men have hastened to share with the public their newly acquired ideas, because of the invitation contained in the patent system, and the phenomenon of rediscovery is now a very rare experience.

"4. The patent system enables inventors to make their efforts fruitful and saves them from the folly of misdirected labor. The *Official Gazette* of the Patent Office publishes to the world the claims and one or more drawings of each patent. Each number of the *Gazette* may be likened to a series of maps, exhibiting that borderland adjacent to the illimitable unknown upon which the sun of human invention has shed its radiance while clocks and watches have registered a week of time. Inventors need not and do not, as formerly, delve in exhausted mines."

The speaker referred to the general unity of opinion that prevailed throughout the world in regard to the preservation of the patent system. The centennial exposition in this country contributed largely to this result. Instead of abolishing the patent laws in England, as had been advocated, in 1883 a new act was passed upon a more liberal basis. Germany has revised its patent law. In all these changes, he said, the American system has been imitated.

In conclusion he said: "Let us hope that the United States, whose place in the vanguard of progress is so largely due to its great inventors, may not now through indifference to its patent system fall back in the procession of the nations. Let us hope that an aroused public sentiment, set in motion by this celebration of the achievements of a century, may demand for the patent system and for the office which administers its functions just recognition of its mighty influence and just provision for its needs as it enters upon the second century of its usefulness."

The Hon. Carroll D. Wright, Commissioner of Labor, then spoke on "The Relation of Invention to Labor," and said that the influence of inventions upon labor has been felt in two directions—economically and sociologically. The economical influence has also been in two ways, but diametrically opposite ways; first, in the displacement or contraction of labor, and, second, in the expansion of labor. Very many modern inventions have created employments where none existed before. In a sociological sense machinery has brought with it a new school of ethics. It is the type and representative of the civilization of this period because it embodies, so far as mechanics are concerned, the concentrated, clearly wrought-out thought of the age. Under the influence of inventions the workingman has learned that from a rude instrument of toil he has become an intelligent exponent of hidden laws; that he is not simply an animal wanting an animal's contentment, but is something more, and wants the contentment which belongs to the best environment.

The mistake should not be made of assigning the cause of strikes and controversies to retrogression or to supposed increasing antagonism or to any desire to destroy the grand results of past inventions. How a new system shall be established with perfect justice to capital and to labor, recognizing the moral forces at work contemporaneously with the industrial, and the perfectly just distribution of profits relative to the use of inventions, is the great problem of the age. Machinery is young—in fact, is only the forerunner of more golden deeds. That the workingman does not receive full justice as the result of the use of inventions must be the conclusion of every student.

The Hon. Justice Blatchford spoke especially to the legal side of the patent system, saying, in regard to the practice in England, that since the time of George III. it has been the uniform practice in England to grant letters patent to a person who introduces an invention not used before within the kingdom, and parliament has repeatedly recognized the principle by granting exclusive privileges to such introducers. James Watt's inventions tending to the perfection of the steam engine were followed by considerable litigation, resulting in numerous decisions straightening out and establishing patent law. Referring to present patent law abroad, the speaker said: "The statutes which now regulate the granting of patents in England are those of August 25, 1883, and December 24, 1888. It is not necessary that a person should be a British subject to apply for a patent. The application must state that the applicant is in possession of an invention of which he claims to be the true and first inventor. The word 'inventor' in these statutes covers an introducer.

"The acceptance of the complete specification is to be advertised, and any person may, within two months thereafter, give notice at the Patent Office that he opposes the grant of the patent on the ground that the applicant obtained the invention from him or from a person of whom he is the legal representative, or on the ground that the invention was patented in England on an application of prior date, or on the ground that the complete specification describes or claims an invention other than that described in the provisional specification, and that such other invention forms the subject of an application made by the opponent in the interval between the making of the two specifications. The patent is to be granted for fourteen years, but is to cease if certain fees are not paid within specified times.

"At least six months before the time limited for the expiration of the patent the patentee may apply for an extension, which may be granted on a favorable report from the judicial committee of the Privy Council for a further term not exceeding seven, or, in exceptional cases, fourteen years, and a patent may be vacated by a court on certain specified grounds."

The speaker then reviewed at some length the scope of the law in this country, and said that in the administration of the patent laws by the courts of the United States the proper rights of inventors have been firmly maintained, while the abuses which have crept in, in consequence of improper reissues of patents, have been corrected. Patents for important and meritorious inventions have been sustained, notably in the case of Morse's telegraph, which was held valid in the case of O'Reilly agt. Morse.

After outlining Morse's inventions and discoveries, Mr. Blatchford concluded his address in the following words: "The principle on which the patent laws are based is to give an inventor an exclusive right, for a limited time, in consideration of his fully disclosing his invention, so that it may be made and used by the public after the limited term shall have expired. Under this stimulus there has come into existence the brilliant succession of inventions which have contributed so greatly to the progress of science and the arts, and to the material welfare of nations and individuals. In this career our own country has played no small part, and it is quite certain that in the future American inventors will do their full share toward illustrating the beneficent operation of the patent laws, and that when, a hundred years hence, there shall be another centennial celebration like the one through which we are now passing, there will have occurred no diminution of the importance and value of American inventions."

Hon. Robert S. Taylor, speaking on the "Epoch-making Inventions of America," said that the real and enduring wealth of the world is its thoughts. It wants just a year of a century since there flashed across the mind of a young Georgia school teacher the thought that a machine could be made which would separate the cotton fiber from its seed by the action of saw teeth. With that thought dawned the epoch of cheap cotton cloth. Forty-six years later the sewing machine made its appearance to sew the cloth and inaugurate the epoch of cheap clothes. The two together gave the human body a new skin. Robert Fulton once said that the three men who had conferred most good on their fellows were Arkwright, Watt and Whitney. He was the fourth. He opened the epoch of steam travel. The railroad and the locomotive followed, like the evolution of birds from fishes, and the Chicago limited is the legitimate descendant from a paddle wheel steamboat. Since Franklin drew the first submissive spark from heaven, Americans have been foremost in the great field of electricity. The subjugation of this great force was begun when Prof. Morse taught it to talk. The steam engine is the breath and muscles, the telegraph the nervous system of the body politic. In the production of electric light, man has come nearer to creation than anywhere else. He has produced upon earth the light of the heavens—a true sunlight in fragments. But the most gratifying of all inventions is the telephone. It imparts a new function to speech and a new sense to the ear. The epoch of news came in with Hoe's cylinder press, and of cheap food with McCormick's reaper. There is no more beautiful invention than the typewriter—the sewing machine of thought, which clothes our ideas as that clothes our bodies. The patent system of the United States rests on twenty-two words in the Constitution. What other twenty-two words ever spoken or penned have borne such fruit of blessing to mankind?

The last speaker in the afternoon session of the first day was Senator Platt, of Connecticut, who is perhaps as widely known among inventors as any member of the national legislature. In his position as chairman of the Senate patent committee he has had a great deal to do with inventive designs. From the beginning he has been deeply interested in this celebration, and gave to the committee all the assistance in his power. He is a member of the advisory committee of the patent celebration. The Senator's theme was "Invention and Advancement," which he treated in the able and thoughtful style which characterizes all his public utterances.

At the evening session Senator John W. Daniel, of Virginia, spoke on "The New South as an Outgrowth of Invention and the American Patent Law." In the course of his remarks he said: "If I am asked the cause of the Northern victory in the late struggle, I look beyond the noise of battle to the Northern inventors, mechanics, and manufacturers." [Applause.] But, continued the Senator, the South applauded Northern genius and welcomed its results. The long list of great inventors from the South, however, proved that the South was no laggard in the race, while the fact that in 1890, 3,000 patents were granted to Southern men shows that the South will soon vie with the North in generous rivalry in every branch of invention. With a thoroughness that evidenced careful research Senator Daniel traced the part taken by the South in inventions of all kinds. Then he recounted the debt owed by the South to inventors, giving the highest place to Eli Whitney's cotton gin and Henry Bessemer's steel process. In describing how these inventions had aided the South to develop its resources, Senator Daniel spoke rapidly and with great eloquence, concluding with an impassioned eulogy of the inventor and with an expression of the hope that some day there would be erected in Washington a hall of sciences in which the achievements of American intellect could be displayed.

Assistant Secretary Willits, of the Department of Agriculture, whose remarks were extemporaneous, spoke of the dependence of the farmer on the product of the inventor.

At the afternoon session of the second day, A. R. Spofford, Librarian of Congress, read an elaborate paper on "The Copyright System of the United States," and was followed by Prof. Thomas Gray, of Indiana, with a paper on "The Inventors of the Telegraph and Telephone." Col. F. A. Seely, of Pennsylvania, Principal Examiner of the Patent Office, also spoke on "International Protection of Industrial Property." In the evening, S. P. Langley, the secretary of the Smithsonian Institution, presided, Secretary Noble occupying a seat on the platform. Professor

Langley spoke briefly of the progress of invention, particularly during the last ten years. Professor William P. Trowbridge, of Columbia College, New York, read a paper on "The Effect of Technical Schools upon the Progress of Invention." The next paper, entitled "The Invention of the Steam Engine," was by Professor Robert H. Thurston, the director and professor of mechanical engineering in Sibley College, Cornell University. The paper was an elaborate history of the steam engine from the time of its invention down to the present time. Captain Birnie, of the Ordnance Bureau, read a paper prepared by Major Clarence E. Dutton, U. S. A., on "The Influence of Invention upon the Implements and Munitions of Modern Warfare," and Professor F. W. Clarke, of Ohio, the chief chemist of the United States Geological Survey, read a paper on "The Relation of Abstract Scientific Research to Practical Invention, with Special Reference to Chemistry and Physics." It is impossible, in the space this week at our command, to give any adequate abstract of these valuable papers, the most interesting portions of which we shall endeavor to give in a future issue.

At the meeting on the evening of April 10, Prof. Alexander Graham Bell presided, and the following papers were read: By William T. Harris, United States Commissioner of Education, on "The Relation of Invention to the Communication of Intelligence and the Diffusion of Knowledge by Newspaper and Book;" by Professor Otis T. Mason, of Virginia, the curator of the National Museum, on "The Birth of Invention;" and by Dr. John S. Billings, curator of the Army Medical Museum, on "The American Inventions and Discoveries in Medicine, Surgery, and Practical Sanitation."

Among the views forming a portion of our first page illustration are representations of a number of curiosities in the way of models and machines, which have been collected and placed on exhibition in the lecture hall of the National Museum. One of these is the identical press at which Benjamin Franklin worked in London. Another represents the water clock, one of the oldest and clumsiest of time pieces, in connection with which is shown a modern chronoscope, measuring time to the five-hundredths of a second. The first life-saving car made by Joseph Francis is also shown, and a model of the plow used by Prof. Morse in laying the first telegraph line. An original model of Davenport's electric motor and circular railway dates back to 1837, and another exhibit is that of the cylinder of the Stourbridge Lion, one of the first locomotives built for traffic in the United States.

Our portrait of President Harrison is from a recent photograph by Charles Parker, 477 Pennsylvania Avenue, Washington.

At the special reception to inventors and manufacturers in the rotunda of the Patent Office on Wednesday evening, there was a large and brilliant gathering. All was ablaze with light and color where the receiving party stood, rich hangings, festoons of flags and diadems, and other forms of incandescent lights contributing to the effect.

During the progress of the congress several meetings were held looking to the organization of a permanent National Association of Inventors and Manufacturers of patented articles, to secure co-operation in matters tending to the improvement of the patent system, that "organized effort may be made to remedy existing defects and provide against danger in the future." On the evening of April 10 such an organization was completed, and a constitution and by-laws adopted. Dr. Gatling, the inventor of the Gatling gun, was chosen president, and Gardner R. Hubbard, of Washington; Professor William A. Anthony, president of the American Institute of Electrical Engineers; Thomas Shaw, of Philadelphia, and Benjamin Butterworth, of Ohio, were elected vice-presidents.

Sensitive Galvanometer.

At a recent meeting of the Royal Scottish Society of Arts at Edinburgh, Dr. R. Milne Murray described and exhibited a reflecting galvanometer for physiological work. The instrument was an astatic galvanometer of the Thomson type, with special modifications. One of these was that the mirror was placed between the two systems of needles, instead of being attached to the upper system. But the principal modification was the mode of damping adopted so as to secure aperiodicity. The filament which carried the needles and the mirror had attached to its lower end a light vane, spade-shaped, which just dipped into an adjustable cup of oil, so that when the needles were deflected, the capillary attraction of the oil from the vane brought the system readily to a standstill. Dr. Murray claimed for his galvanometer great sensitivity, a high figure of merit, and a remarkable degree of aperiodicity.

THE electric street cars which for the past year have been run on the Fourth Avenue street railway, this city, and which were propelled by storage batteries carried on the cars, have been withdrawn. Reason, litigation over the patents.

Correspondence.

Life Saving Telephones—A Good Suggestion.

To the Editor of the Scientific American:

I read with much interest the article in the SCIENTIFIC AMERICAN of February 21, about the United States life saving service, and it was a surprise to me to see that the surfman, patrolling the shore, not having better means by which to communicate with his station. If I understand the article right, he will have to run to the nearest station as soon as he sees a wreck, and report, which necessarily will take more or less time, and may mean many lives lost. That mode of operating seems to me to be crude and old fashioned and ought to be dispensed with, and in its place should be erected a telephone line, running close to the shore, with one or more patrol boxes, furnished with telephones, through which the watchman could report. Such a line would not necessarily be very expensive. A one wire system I think would be sufficient, supported on short poles. The life saving crew could be instructed how to keep the line in repair and one of the telephone companies ought to supply the instruments, free of charge, or at least at a nominal price, considering the humane purpose for which it is to be used. We see how well the signal system works in our large cities. How many millions of dollars' worth of property and how many lives have been saved by the fire alarm system, and likewise how efficient has the police alarm system shown itself to be, and I can see no reason why the same system couldn't be adopted on our life saving service. If this idea is new, I would like you to publish it. If not, throw it in the waste basket.

A. LARSEN.

27 Hastings Street, Chicago, Ill.

How to Cut Glass by Means of Heat.

To the Editor of the Scientific American:

In the SCIENTIFIC AMERICAN of March 28, under Notes and Queries, I notice that J. B. V. asks how to cut a bottle off near the bottom without destroying the remainder. The answer given is: "File a notch, start a crack with a red hot poker, and lead it around." In "Experimental Science," by Geo. M. Hopkins, I notice a similar method, the only difference being that the author recommends giving the bottle a rotary motion inside a wire curved similarly to the bottle.

It may be due to my awkward manipulation, but I have never been able to obtain very satisfactory results with either method. If I make use of an iron sufficiently large and long to hold the heat well, I cannot guide it where I wish. If I make the iron smaller and shorter, so as to control its movements better, I either burn my hand or the iron is so small that it soon loses its effective power in producing unequal expansion, and requires very frequent heating.

To those of your readers who can produce good results with a hot poker I have nothing to say; but to those who, like myself, are unable to satisfactorily make use of the hot iron, I have a method to suggest that is simple, and with me has given very desirable results.

If a piece of quarter inch soft glass tubing be drawn out so that the bore be somewhat less than one-half a millimeter in diameter, and then attached, by means of the large end inserted into a piece of rubber tubing, to a gas spigot, a small flame, about one and one-half centimeters long and two or three millimeters in diameter, can be produced. By holding the piece of glass tubing as one would a lead pencil, with the point of the flame applied to the file scratch or an already started crack, one can lead a crack, not by long, irregular jumps, but gradually and accurately, in any direction he may desire.

This device, though very simple, has given me most excellent results, not only in cutting bottles and large glass tubes, but in cutting plate glass when a diamond cutter was available. I have found that a pointed flame, formed with a small opening and under the ordinary pressure of the gas, works better than a shorter and thicker flame, formed with a larger opening and with less pressure. The flame in the one case will be almost in the same plane with the tubing, if the glass tube be held horizontally or as a pencil would naturally hang in the hand, and its point can be applied at any angle. In the case of the flame formed from the larger opening, and with the gas pressure partially cut off, the flame will curve upward, and its point is with difficulty applied at most angles.

GEO. M. TURNER.

Auburn, N. Y.

Wooden vs. Metallic Ties.

To the Editor of the Scientific American:

In SUPPLEMENT, No. 789, February 14, 1891, in the article on "Preservative Treatment of Timber," the author draws a comparison between the expense of wood and metal ties, but omits several important factors. He proposes to treat the cheaper woods and increase the life, but overlooks entirely the fact that the wood which he considers, hemlock, or any other soft wood, will *wear* out before it rots, when not treated. It will not hold the spikes or support the rail for heavy traffic, as the rail works its way right down through it. He puts the price of oak ties at 70 cents, and the spikes cost 2½ cents per pound, and it takes 2 pounds per tie, and the spikes have to be renewed once during the life of the tie, making 10 cents for each tie.

With the large hewed Virginia ties of all thicknesses and widths it takes a day's work to remove, replace, spike, and properly tamp from seven to ten ties with slag ballast. A section boss here has, on the average, four men at $1.15 per day, and to this must be added 44 cents (one-fourth boss' wages), making $1.59, which at ten ties per day is .159 per tie.

Cost of tie in road .70 + .10 + .159 + .041 (second spiking) = $1.00. Many actually cost more, to say nothing of driving *all* spikes down in the spring, etc.

The writer fixes the life at 7 years. The dollar is to be lost in 7 years, or .143, nearly, per year, to which must be added interest at 5 per cent, making a yearly expense of .193 for the best ties; while for cheaper ones it is more.

Wood ties vary in thickness, and the water settles under these thick ones, causing the unpleasant act of "pumping," which makes the thickest tie the poorest support.

The steel tie is worth for scrap about one-third of cost, but we will count it as only paying for changing the tie and interest on cost of change. We received the estimate of some of the Mahoning Valley iron workers and rolling mill managers, and they estimate a tie of angle steel plate, with rail fastenings of a certain pattern taken as a basis, at 120 pounds, at a cost of $2.00.

Counting the life of the tie at 40 years (iron men say it will last longer) it would be a loss of 5 cents per year, to which must be added 10 cents interest, making 15 cents as the actual yearly cost of each tie. To those who think that 40 years is too long an estimate, we will say that it proves cheaper with a life of only 22½ years, as will be seen by division, making the yearly loss .0889 + .10, or .1889.

The figures given were obtained from railroad men.

F. F. MAIN.

Bristolville, Ohio, April 5, 1891.

An American Blast Furnace in England.

The new furnace which Palmer's Shipbuilding and Iron Company, limited, have put up at Jarrow-on-Tyne is virtually an American one, as regards its lines and method of working. It will, says *Engineering*, afford manufacturers evidence as to whether the American or Cleveland blast furnace practice is the more economical and satisfactory for the British producer, and thus its working will be looked upon with more than ordinary interest, as there is much controversy on the point in question. The furnace is an exact copy of the most recent one at the Edgar Thomson Works of Messrs. Carnegie Brothers, at Pittsburg—a furnace which has produced up to 2,500 tons per week of pig iron, which is more than double the output of our best hematite furnaces, nearly five times as much as an ordinary Cleveland furnace, and almost twelve times that of the average Scotch furnace. The new Jarrow furnace is 76 ft. 2 in. in height with a 20 ft. bosh and 11 ft. depth of well. It has four Cowper hot blast firebrick stoves, and is blown by a compound condensing engine having 100 in. blowing cylinders. In America it is not the practice to have one blowing engine to several furnaces as it is in England, but each furnace has its separate engine, and this will be the case with this new furnace. There are eight tuyeres made of bronze, the use of that metal for such a purpose being peculiar to America, and has till now not been adopted in our own country. The blast will be driven into the furnace at a pressure of about 8 lb. per square inch, in the United States the pressure is nearly 10 lb., whereas in Cleveland it is only 5 lb. to 5¼ lb. On this account the furnace must be expected to produce a good deal more iron in a given time than the ordinary British hematite furnace, for it is to be fed with hematite ore, but it will not come up to the largest records in the United States, seeing it will have to smelt a 50 per cent ore, whereas in America they use a 60 to 63 per cent ore, which is moreover much less refractory than the Spanish ore generally used here. When blowing at such a pressure something, of course, has to be done to preserve the brickwork from the extra heat, and the furnace is, therefore, encircled by rings of water tubing 64 in number, through which some 1,500 gallons of water circulate per minute.

Palladium Plating.

Palladium, which is a whiter, lighter, and more fusible metal than platinum, has of recent years been much used to plate watch movements, says the *Electrician*. According to M. Pilet, four milligrammes (about one-seventeenth of a grain) of palladium is sufficient to coat the works of an ordinary sized watch. M. Pilet recommends the following bath: Water, 2 liters; chloride of palladium, 10 grammes; phosphate of ammonia, 100 grammes; phosphate of soda, 500 grammes; benzoic acid, 5 grammes. This bath is suitable for all metals except zinc.