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THE ARMOUR INSTITUTE, CHICAGO.
The Armour Institute in Chicago has added two departments of study that ought to be very popular and productive of excellent results. They are the mechanical and electrical engineering departments. There is a dearth of well trained, practical mechanics who can work with their hands as well as with their brains. Colleges and technical schools all over the country are turning out mentally trained mechanics, but the number of schools is very few that offer a thorough practical manual training—schools suited to educate the great body of working mechanics. In the electrical line there has been more or less of a reason for the lack of well trained men in the fact that the demand has been so great, and the industry so new, that only unskilled men have been obtainable. But this excuse no longer holds good. To-day the demand is as great as ever for educated, well trained men who have a practical knowledge of electrical matters. One of the difficulties in connection with isolated electric lighting plants is that of securing engineers who have the practical knowledge to run the steam plant with skill and economy and at the same time know how to operate and keep in good condition the electrical equipment. Mentally educated men are a drug on the market, while manually trained and educated men are in demand.

THE BELL TELEPHONE PATENTS.

We have received many letters from readers in various parts of the country asking if they are at liberty to make electrical telephones, now that Bell's original patent has expired. In answer we say no. Bell's original patent was granted for 17 years, dated March 7, 1876, and in the fifth clause he claims "The method of, and apparatus for, transmitting vocal and other sounds telegraphically, as herein described, by causing undulations, similar in form to the vibrations of the air accompanying the said vocal or other sound, substantially as set forth."

This claim was held by the Supreme Court to cover any kind of telephonic apparatus in which an undulatory electrical current was used. This patent expired March 7, 1893.

Bell's second patent, dated January 30, 1877, covers the construction of the well-known Bell instrument and the parts thereof. This patent runs for 17 years from its date and will expire January 30, 1894. Not until that date will the public be free to make use of Bell's invention.

Other important patents are held by the American Bell Telephone Company which have long terms to run; these are explained in the company's advertisement on another page, to which we call the special attention of readers.

THE WORLD'S CONGRESS AUXILIARY.

Modern civilization has brought into existence many great questions which are threatening in their tendencies because of a lack of understanding of their cause and remedy. These, like all great questions, require time for their solution. It is necessary to study and analyze them from all points of view and compare the results that have already been obtained, whether these results be good or indifferent, or failures.

A feature of the World's Columbian Exposition which attracts comparatively little attention, yet which has this particular work in view, is the holding of the several congresses under the auspices of the World's Congress Auxiliary.

Never before in the history of the world has there been such a well-planned and broadly conceived effort to call together eminent minds from all parts of the world, representing every progressive movement. Public attention is drawn each year more directly to the needs of the several movements—such as education, science, religion, reformation and the like; and a gathering at which the best thought of the age in each of these movements can be concentrated, the progress made to date be distinctly outlined, and the needs for better and more aggressive work in the future be discussed, cannot well fail to be productive of good results. The programme of each congress is so planned that single theories or one-sided views cannot well control the meetings, and ample time is assigned each congress for carrying on its work. The publications that will be issued by the Auxiliary, giving the results of each congress, will be valuable data from which to gather strength for concentrating greater energy in each line of effort.

THE VALUE OF A PATENT.

Speaking of the value of patents, a business man interested in such things asserts that a patent does not patent in this country. All that the Patent Office does is to give you a paper with some writing on it, and if another man steals your idea, and goes to manufacturing your invention, the Patent Office will not lift a finger to protect you or to stand by its own decision. The fact that you've got a patent is a point in your favor, but you've got to hire lawyers and fight the thief in the courts, and if he can stand it to hire lawyers longer than you, that settles you, and you might as well make him a present of your invention. There

are lots of men in the country getting rich on the discoveries of other people. All they had to do was to take 'em and fight the real discoverers into poverty. The Patent Office, to be respected and to be of any use, ought to have the power to cause the stealer of a patent to be sent to prison.—Railway Review.

[Concerning the above, we would say the function of the Patent Office is simply to assist and encourage inventors by granting patents for new and useful inventions and discoveries. To attack or to punish people is no part of the duties of the Patent Office.

Property in patents is held under much the same tenure as other property. If a man receives a deed of lands, he is liable to annoyance from infringers, squatters, and other claimants. If anybody invades his rights he has a remedy through the courts and is obliged to employ lawyers to defend his interests and defeat infringers. It is the same with patent property. The courts are always open to the inventor for his protection, and his patent, moreover, gives him certain special facilities in the prosecution of infringers which are not enjoyed by holders of real estate. The infringer of a patent, if he does not obey the mandate of the court and desist from infringement when so ordered, may be at once imprisoned.

Property in patents is just as secure, and the means for its defense just as ample, as for any other species of property. It is true there are occasional litigations concerning patents in which inventors are made to suffer at the hands of powerful and unfeeling corporations; but the same may be said, probably to a greater extent, of innocent holders of other species of property. We think it probable the rights of patentees are better respected and inventors less troubled with infringements than any other class of proprietors.

Every year there are granted some twenty-five thousand new patents; yet the number of lawsuits where deliberate infringement appears to have been attempted may almost be counted on the fingers' ends. Indeed, it must be admitted the number of patent suits of all descriptions is exceedingly small, when we consider the immense aggregate of patents issued, and the additional fact that in nearly nine-tenths of all our manufacturing industries patents, in some form or other, are made use of.—Ed. S. A.]

Steam Street Railways in New York and Brooklyn.

The elevated steam street railways of New York and Brooklyn are great conveniences for the public, but they are sources of dirt, din, and danger to many a passing victim in the streets below. Chunks of coal, bolts of iron, hot and cold water, fiery coals, these are only a part of the droppings that fall from the rattling trains. It is a curious fact, however, that many people love to live close to the lines of these roads.

The other day, in New York, a sober burgher was, to his amazement, suddenly knocked down by what he thought was a meteor from the heavens; but it proved to be only a man, who, by reason of a state of dizziness, fell from the elevated railway station to the street below. Both men were considerably hurt, but will recover.

In Brooklyn, Mrs. Hannah Reilly sat at the front window on the third floor of 37 Myrtle Avenue, rocking her infant to sleep. The structure of the Brooklyn Elevated Railroad is about level with the window. A train passed by on its way to the bridge, and at that moment a missile came through the window, partly tearing out the lower sash, and whizzed by Mrs. Reilly's head. She screamed, and, picking up the baby, ran to the dining room to her husband. Blood poured from three gashes in her face and two others in each hand. She fainted, and her husband sent for Dr. Corrigan, of Jay Street.

Mrs. Reilly was still unconscious when the physician arrived, and he had some difficulty in stopping the flow of blood and reviving her. He succeeded finally, and the woman was put to bed in a state of collapse.

A heavy iron bar was found beside the chair in which Mrs. Reilly sat. Broken glass was scattered all over the room. It is supposed the rod flew from the engine of the train which passed at the time.

Steam Engine Saws.

The Sonora Independent says:
"The introduction of a new saw for lumber is to be noted—an upright implement, thin like a bandsaw, and having direct steam attachment. At each end of it is a steam cylinder, each of which has but a single steam port. The upper piston head draws the saw and the lower piston up, and the lower piston draws the saw and the upper piston down, each piston drawing the saw, but neither of them pushing it—this causing the saw at all times to be rigid, so that a very thin saw can be employed. Below the lower cylinder are a heavy pair of balance wheels, these giving a steady as well as uniform motion to the saw, and to these balance wheels are connected a pair of rods, the upper ends of which connect with a knuckle joint at the lower end of the saw, thus throwing the lower end of the saw out as it is going up and against the log as it is coming down. The log carriage is operated by the same engine that runs the saw."

Notes from the World's Columbian Exposition.

The break in the weather has made a decided change in the appearance of things at the World's Fair grounds. The ice and snow have disappeared, the frost is well out of the ground, and with the milder weather outdoor work is being rushed, giving an appearance of more work being done than has been evident for a long time. Piles of rubbish are being cleared away, and preparations are being made to harden the walks and promenades, lay the grass plots and arrange flower beds. During the winter more or less damage has been done to the staff work on the buildings, either by its being cracked off by frost or being broken in one way or another. These broken places are being repaired preparatory to painting the exterior of all the buildings. The painting machines have been overhauled and new ones secured, and at the rate the work is now going on, the buildings will be painted in plenty of time for the opening ceremonies. The work of gilding the dome of the Administration Building is progressing well, and when completed will add greatly to the effect of the view of the grounds as seen outside the park. The work of gilding the Golden Entrance of the Transportation Building is far enough advanced to show what a startling effect this building will have with its polychromatic decorating. It has been christened the "Rainbow Building."

The recent wet weather, together with the melting of snow and ice, showed that there was scarcely a watertight roof on any of the large buildings. There has been more or less trouble from these leaks since the buildings were completed, and the contractors have been requested to make necessary repairs, but have generally failed to do so. Further delay being out of the question, the construction department of the Exposition has now put a large body of professional roofers to work, and little, if any, more trouble will be experienced from this source.

Exhibits continue to arrive by the train load, but during the past month more results could have been accomplished had there been exhibits at hand. Even now there is more delay than there should be, with the opening day so near. Whatever work remains unfinished May 1 will be more from delay on the part of exhibitors than from any fault of the Exposition authorities. Since March 1 all the larger buildings have been near enough completion for exhibitors to begin work of preparing their displays.

In inspecting the buildings that are devoted exclusively to exhibiting purposes, it is a relief to get away from the ever-present staff work and see the Forestry Building, the exterior of which is made of natural woods with the bark intact. A broad veranda extends around the building and the posts that support the roof of this veranda are trunks of trees, three being grouped together for each support, and they comprise all the well-known forest trees. Some of the larger flat surfaces are covered with slabs of bark to complete the general intent of the design. The effect of this building is pleasing and it is appropriately located on the shore of the lake. The other Exposition buildings are covered with staff, and the same is true of many of the State and foreign buildings, and also of the structures of the several concessions in the Midway Plaisance.

Many wild reports have been circulated regarding the amount of money the Exposition will receive from the concessions which have been sold. One statement which has been widely circulated was to the effect that an income of \$3,000,000 or more would be received from this source. The fact is, practically every concession is sold on the commission basis, so that the returns received will depend upon the popularity of the several concessions with the visitors. It is safe to say, however, that very substantial returns will be received, as the concessions are numerous and some of them very valuable. Among those inside of the main grounds are the restaurant service, a sea and lake food restaurant, the Japanese tea house, the Esquimaux settlement, the Polish cafe, the clam bake, the moving sidewalk, the cliff dwellers, the intramural railway, the electric launches, the steam launches, the Venetian gondolas, and many smaller ones, such as peanuts, popcorn, etc. Most of the concessions pay about twenty-five per cent of their gross receipts to the Exposition, but in some instances, in which the profits are large, the percentage on the concession corresponds. Thus popcorn pays seventy per cent of the gross receipts for its privilege.

The Midway Plaisance is lined with special concessions its whole length, from Stoney Island Avenue to Cottage Grove Avenue. Among the more important of these concessions are the Irish industries, the Libby Glass Company, the Venetian display, Hagenbeck's animal show, the Irish village, the Japanese bazaar, the Natatorium, the Dutch settlement, the Bernese Alps panorama, the German village, the Turkish village, the Moorish village, the streets of Cairo, the Persian concession, the Algerian and Tunisian display, the Morocco exhibit, the Ferris wheel, the Chinese village and theater, the captive balloon, the Dahomey village, the Lapland village, the national Hungarian orpheum, the sliding railway, etc. Extra admissions

will be charged to view these special exhibits in the Midway Plaisance, and the Fair will receive a commission on all the income. On merchandise sales the percentage is only five to ten per cent.

It has been a good deal of a question just how to arrange for the payment of these commissions, and the financial managers of the Exposition have considered many plans. The one finally decided upon is the check system. The would-be purchaser finds what his purchases amount to, then buys at a booth, managed by Exposition employes, checks to represent the amount of the purchases, and the check is given in payment of the goods. A corresponding check is retained by the Exposition, having been a coupon as it were to the paying check. In this way the Exposition can handle all the funds, while the holders of concessions are relieved from this bother, and all possibilities of fraud or deception are guarded against. Millions of checks, ranging in price from five cents to one dollar, have been ordered printed for this purpose.

The intramural road is nearly ready to be officially tested. Enough of the power plant is installed to run a train, and one train of four cars is already equipped. The purpose of the holders of this concession is to have the system thoroughly tested at least a month before the opening of the Exposition, in order that its efficiency may be guaranteed. There is nothing novel in the power plant except the enormous size of some of the generators, which will be direct-connected to two Corliss engines. But the method of transmitting the electricity is an entirely new one, as the trolley wire will be between the tracks instead of overhead, as in the usual construction. Each motor car will be fitted with four motors, each of fifty horse power capacity, and will be designed to haul a train of three cars. The cars are richly colored, with the word "Intramural" at the top on each side. Each car will be designed to accommodate 100 people. This road comprises three miles or more of double track. The power house is at the extreme southeast corner of the grounds, and the road extends from near the east side of the Agricultural Building, where there is a loop around the group of buildings, with stations convenient to each of the main buildings and most of the State buildings, the loop at the other end of the line being close to the Fisheries Building.

The building which is to serve as kitchen and storehouse for the restaurant service of the Exposition is now being built. It will be a two-story structure, 125 feet wide and 325 feet long. On the first floor will be a dozen or more large ovens, which will have the capacity for using about 100 barrels of flour a day. On the second floor will be a large dining hall, where most of the Exposition employes will be fed. The building is designed to have a capacity to handle 15,000 pounds of meat a day. It is proposed to have 125 or more eating places inside of the grounds, which will be supplied with food mostly from this kitchen. One large restaurant has already been opened for the benefit of Exposition employes and visitors.

The financial report of the Exposition of all expenditures up to March 1 shows that \$15,584,310.16 have been spent, and all but about \$2,000,000 of this amount is for construction. The gate receipts up to date are reported to aggregate \$205,310.75, showing that 821,243 people have visited the grounds since the admission fee has been charged.

The International Sunday School Association proposes to construct a model Sunday school building near the Fifty-seventh Street entrance to the Exposition grounds. The building is not only to be convenient in design for Sunday school purposes, but also to be a general place of meeting for Sunday school workers, and a central point for the holding of religious services.

Electricians in the employ of the Exposition are hanging arc lamps throughout the buildings and grounds, and in some of the buildings this work is nearly completed.

All of the walks and promenades will be brilliantly illuminated, as the lamps will be placed every seventy-five feet or so. The shores of the lagoon will be almost as light as in daytime, so that at evening sessions of the fair riding in the electric launches and other boats in the lagoons will be one of the most attractive features of the Exposition. The buildings will be correspondingly brilliantly illuminated. In the main building there will be probably 1,200 arc lamps, in addition to a great many incandescent lamps. In the Electricity Building there will be special displays in artistic effects in electric lighting with colored and miniature incandescent lamps, in addition to about 400 arc lamps. The basin will be particularly highly illuminated on open evenings, and for this purpose there will not only be several hundred arc lamps, but also several thousand incandescent lamps, the two electric fountains, and search lights.

A number of brick buildings for hotels and other purposes were rushed up this past winter in the neighborhood of the Fair grounds, and in two or three instances walls which were constructed during the coldest weather, when the mortar froze almost as soon as it was laid, have begun to bulge out. The city de-

partment for the inspection of buildings had a sad lesson a few weeks ago, from neglect to order walls torn down which were unsafe and which fell down because of this neglect and caused the loss of several lives. With this lesson in mind, the department is particularly active in watching some of the temporary structures in the neighborhood of the Exposition grounds. In all instances walls that are not safe will be torn down or materially strengthened.

Draining the Okefinokee Swamp.

The work of draining Okefinokee swamp, the biggest undertaking of its character in America, which will eventually reclaim 220,000 acres of the finest agricultural land in the country, is progressing at a remarkably satisfactory rate. The great swamp is situated in the southeastern part of Georgia, and extends northerly from the border line of Florida. Creeks of St. Mary's River and Suwanee reach to the swamp. One of the engineers in charge of the work was in the city recently and gave the writer an interesting chat about the scheme, which will open up a section which for centuries has been under water and muck, the home of alligators and various other reptiles.

One hundred and fifty laborers are now at work at the swamp, and the construction of the great canal, which is to carry the water from the swamp to St. Mary's River, is being pushed forward as rapidly as machinery and human hands can accomplish it. After January 1, this force will be doubled, one-half working during the day and the other at night, so that this year's results will be twice as much as that of the last twelve months.

This canal, when completed, will be 150 ft. wide and 63 ft. deep, with a fall of 125 ft. to St. Mary's River. The most difficult part of the construction will be through a high knoll two miles long. Through the middle of the swamp another canal, sixteen miles long, will be constructed, with small branches, the whole to act as feeders to the big drainage stream.

When the latter is completed, two hydraulic pumps, with a capacity of 30,000 gallons each per minute, will force the water off the swamps, while the largest inland dredger in the world will remove the muck and tear away the stumps, leaving behind a beautiful clay subsoil, which has become wonderfully rich by the muck accumulations of centuries. This muck averages 6 ft. deep. The dredge is a ponderous machine 90 ft. long, with a 40 ft. beam. It is what is known as a combination dipper and stump puller.

By April 1 the company will be able to secure timber from Okefinokee. In this alone the wealth of the swamp is incalculable. Its pine growth is the most magnificent in the world in point of size and quality, and its cypress deposits cannot be equaled anywhere. The pines average 70 ft. to the limb, are as straight as an arrow, and from 1 to 8 ft. in diameter, while the cypress trees are enormous in size, the average diameter being from 10 to 12 ft. Saw mill men have besieged the company to secure the timber, but, as it is of such valuable quality, the company will probably erect saw mills on the edge of the swamp and develop the timber on its own account.

The engineers expect to find many valuable curios as the work progresses. Already they have found evidences of Indian habitation of the numerous small islands which dot the great swamp. Numbers of Indian mounds have been discovered on these islands filled with all styles of pottery, specimens of which have been sent to the Smithsonian Institution at Washington.

The most interesting curiosities, however, are expected when the big dredge begins its work of removing the muck from the swamp. The engineers believe that mammoth wild animals, now extinct, made their homes in the swamp in past centuries, and are anxiously looking forward to the turning up of carcasses to prove their theories.

Just what length of time will be required to complete the draining of Okefinokee the engineers are unable to estimate, but it is safe to say that there is work ahead for several years. When the reclamation is accomplished, the stockholders of the company who had the nerve to put their money into the scheme, which, when first broached, appeared to many as a wild vagary, will realize handsomely on their investments. It may take a long time, but it is one of those things worth waiting for.—*Savannah News.*

A Trolley Balloon Line.

Mr. Opha Moore, of Columbus, O., has proposed a system of aerial navigation which does away with the necessity of transporting a heavy motor. He proposes to use balloons to carry the passengers, and to provide each balloon with an electric motor. The balloon is to be driven from a trolley line. The motor is to actuate a screw. Exactly where this plan surpasses the system of cable traction applied to balloons does not appear. The trolley lines are supposed to act also to hold the balloon on its course. The poles are to be about one hundred feet high. The air ship is to float 40 to 100 feet above them. Parachute descents are proposed, if necessary.