Correspondence.

The Galveston Jetties.

To the Editor of the Scientific American:

The SCIENTIFIC AMERICAN of January 27 has an interesting article on the four miles of jetty work at the mouth of the Columbian River, but its writer is mistaken in his statement that it is the longest jetty in the world. The south jetty, at the entrance of Galveston Harbor, is completed to the crest of the outer bar and is 32,000 feet long, which is a little over six miles of completed jetty, and there is 829 feet more uncompleted. (See annual report of Chief of Engineers for 1893, Appendix U.)

Galveston Bay, at the southern base of which lies Galveston Island, on the eastern end of which the city is situated, covers an area of about 400 square miles. Into this bay flow the Trinity and San Jacinto Rivers and numerous smaller tributaries. The ebb current discharging through Galveston Pass exceeds ten times that flowing through the South Pass jetties of the Mississippi. (*Vide* Col. Ernest, U.S. Engineer, before U.S. Senate Commerce Committee, January 30, 1890.) In its original condition this enormous discharge found vent into the Gulf over the wide unconfined stretch between Galveston Island and Bolivar Point. The general plan of improvement contemplated the compression with two rock walls of this giant force, to cause it to scour and carry to sea the sandbar which lay between the deep water inside the harbor and the deep blue water without.

The results thus far are the south jetty, extending eastwardly into the Gulf 32,829 feet, or over six miles; and the building of about two miles of the north jetty (work begun April, 1893) out from Bolivar Point, in its steady advance to a point opposite the sea end of the south jetty. When completed these two ends of the jetties will be about 7,000 feet apart.

The annual report of the Chief of Engineers for the fiscal year ending June 30, 1893, showed a navigable channel over the inner bar of 23 feet, an increase of 2 feet in twelve months, and a channel depth of 14 feet at mean low tide, an increase of three-fourths of a foot since June 30, 1892. The bar pilots report the constant and easy passage of vessels over the outer bar drawing 15 to 15½ feet, and a depth of 16 feet or more in ordinary high tides is not infrequent—an increase of a foot or more in twelve months, for actual use.

A glance at the construction of the jetties shows their substantial character. On a base of about 60 feet they rise to a height of about 5 feet above mean low tide—a riprap sandstone core, with a covering of immense granite blocks, which the heaviest wave action cannot disturb. Once inside the Galveston bar, there is a harbor sufficient in depth and area to float safely the navies of the world.

A commission of government engineers examined all the harbors on the Texas coast and reported that Galveston afforded the only possible port for 30 feet of water. This was based on the volume of water at ebb flow and the area of Galveston Bay affording a volume of water for scour not found at any other Gulf port.

Thirty feet is necessary for war ships of the government, and if the jetties do not give it by scour the contract for the jetties requires dredging. So far as the work has progressed it is so satisfactory that dredging has not been resorted to. For commercial purposes, 18 to 20 feet of water is adequate, and there is every prospect of that depth by the fall of 1894.

The work is done by contract, the sandstone carried by cars on track piled in advance of the work; the large granite blocks are swung in place by derricks from barges. The work was in charge of Major Chas. J. Allen, Corps of Engineers, to February 8, 1893, and of Major A. M. Miller, Corps of Engineers, since March 21, 1893, with Lieut. Wm. C. Langfitt, Corps of Engineers, from February 8 to March 21, 1893, Division Engineer Col. C. B. Comstock, Corps of Engineers. The estimated cost of the work in progress is $6,200,000, and has been let by contract. This contract is a War Department matter, to avoid possibility of delay; the money to pay for the work is not a River and Harbor appropriation, but an item in War Department work. The government has no 30 foot harbor on the coast and must have one at Galveston, the only possible point, and must have it as soon as possible.

The figures given as to work done and increased depth are all taken from the report of E. M. Hartrick, assistant engineer, made to Major A. M. Miller, June 30, 1893, at the end of the last fiscal year. The work and its results since then have made fine progress.

The normal tide at Galveston is about 18 inches on flood, as there is for practical purposes about an average of 15 feet to 15 feet 6 inches of water on outer bar, the government reports being based on mean low tide. When the work commenced there was only 13 feet on the inner bar. The last government report of June 30, 1893, shows 23 feet.

C. H. MCMASTER,
H. B. CULLUM,
GEO. E. MANN,
Committee of Chamber of Commerce of Galveston.
Galveston, Texas, March 27, 1894.

The Gegenschein or Zodiacal Counter Glow.

BY E. E. BARNARD.

In the first half of the century a German astronomer, Brorsen by name, in watching the face of the sky on moonless nights, noticed a large feeble glow of very diffused light in the midnight sky. This feeble light was from 10° to 15° in diameter. He soon found after a few observations that the object was moving nightly toward the east among the stars. A series of naked-eye observations soon showed him also that it was not only moving easterly among the stars, but that it was exactly opposite the sun and always remained so, and that its center lay exactly in the ecliptic. So exactly did it move with and in opposition to the sun, that if an imaginary line were passed from the sun through the center of the earth and prolonged to the sky, it would always pass through the center of this queer object. This fact being established, suggested to the Germans a name for it; they accordingly called it the Gegenschein—a combination of two words, *gegen*, opposite, and *schein*, light, meaning a light in opposition.

It seems after this for a time to have been neglected, if not almost forgotten.

In 1871, however, it was again independently discovered by Mr. T. W. Backhouse at Sunderland, England, who secured observations that confirmed its opposition to the sun. But even this second discovery did not attract attention to it as it should have done, and many people still doubted its existence.

In 1883, about October 1, the writer in seeking comets at Nashville, Tennessee, one night happening to look up to rest his eyes, saw a faint hazy glow near the constellation of Pegasus. This was thought to be a bit local haze, though it seemed abnormally permanent. The next night it was seen again and was therefore no ordinary haze. A few nights' location of its position showed that it was moving along the ecliptic eastward about one degree a day. Could it be an immense comet? It was certainly no ordinary meteorological phenomenon. The positions obtained were sent to an eminent astronomer with the suggestion that it might be some extraordinary kind of comet. He wrote back that I had discovered the Gegenschein.

Since then I have been very much interested in the object and have made numerous observations of its position. From these observations some new facts have been developed concerning this remarkable phenomenon.

I have said that this object defies the power of the telescope; this is true. From its great size and diffuse nature no telescope can grapple with it, its feeble light being destroyed by the power of the instrument and the want of contrast—the largest field being vastly smaller than the Gegenschein. Though it cannot be seen with any telescope, it is nevertheless a decidedly noticeable object with the naked eye when you know where to look for it.

Just what this mysterious light is no one has yet been able to satisfactorily explain.

Professor Arthur Searle, of the Harvard College observatory, has made an extensive study of the Gegenschein and is inclined to believe it due to an infinite number of small asteroids.

Between the orbits of Mars and Jupiter are known to be no less than four hundred small planetary bodies It is probable there are thousands and possibly millions more of these dust worlds. The smaller ones found in recent years are perhaps not over 10 or 15 miles in diameter. As they decrease in size doubtless they multiply in number, until finally they exist in untold multitudes of a size comparable with small stones and particles of dust, which no telescope will show individually. Each one of these small bodies is a miniature planet and must shine as a planet by reflecting the light of the sun. It therefore must present to us phases just as Mars does, but from the smallness of the objects we cannot see these phases—but none the less they must have an effect on the brightness of each little asteroid, and must diminish its light accordingly.

Let us assume there are a sufficient number of these tiny planets; though they may be too small to be seen individually in a telescope, yet their combined light may be so great as to affect the eye, and thus we might expect to see a feeble zone of light extending across the sky and corresponding to the asteroidal zone. Such we actually have in the zodiacal band. What would be the effect of phase of these individually small bodies upon the appearance of this zone of light? When opposite the sun each of the objects would shine with full enlightened disk, and this vast collection of fully illuminated particles would augment the light of the zone and give a greater luminosity immediately opposite the sun. Away from opposition, and the phase would begin to diminish the quantity of illumination. To this must also be added the fact that at opposition each asteroid would be nearer us and brighter from this cause also. Both causes tending to give a maximum of light opposite the sun—a Gegenschein.

This theory certainly appears very plausible, but there are objections to it.

There is one thing certain, if the Gegenschein is not really an atmospheric phenomenon—and everything except the fact of its existence seems to go against this supposition—it is at a considerable distance from us. Careful observations have shown no evidence of parallax. Of course observations of such an indefinite object cannot be made with anything approaching to accuracy, but if it were at no greater distance than 100 000 miles, its parallax would have shown in the observations.

That a satisfactory explanation of this most singular phenomenon will be arrived at when it has been sufficiently observed there is no doubt. Therefore it is very desirable that as many careful observations of its position and descriptions of its appearance as possible should be obtained.

Here is a field which offers a splendid opportunity for amateurs to do new and valuable work where no instrument whatever is needed— nor indeed can be used. All that is required is a star chart and an approximate knowledge of the time—to within an hour or so. The observer will find much to interest him in watching this—one might almost say—uncanny thing as it circles the sky with its slow and measured pace.

The Gegenschein is best seen in September and October when it is passing from Sagittarius to Pisces. It is then a large and roundish glow, some 15° or 20° in diameter.—*Popular Astronomy.*

The Phonograph as a Witness in a Nuisance Suit.

In the Chancery Division, London, Mr. Justice Stirling had this case before him. The action was brought by certain occupiers and leaseholders in Manchester Street, Manchester Square, where one of the company's central stations is erected, to obtain an injunction against the defendants on the ground of a nuisance caused by vibration. Mr. Graham Hastings, Q.C., and Mr. Beaumont appeared for the plaintiffs, while Sir R. Webster, Q.C., Mr. Phipson Beale. Q.C., and Mr. Vernon Smith, represented the defendants.

Mr. Graham Hastings, in opening the case, said the object of the injunction sought for was to prevent the continuance of the nuisance created by the defendant's works. The nuisance was so material that the vibration consequent upon it made it intolerable to the occupants of the houses, or some of them, to dwell there. It seemed to be a most mysterious thing. Sometimes the vibration affected the top of the house, sometimes the bottom. According to the view of one gentleman, it arose from the fact that that part of the city of London was built on the bed of the river which once flowed over the locality, and the soil was of that character that it conveyed the vibration produced by the engines. It was said that this could be got rid of, but the learned counsel contended otherwise. The real defense, he contended, was that they had been doing all they could to abate the nuisance. Mr. Hastings proceeded to dilate upon the effects of the nuisance complained of, and quoted instances where families were shaken in their beds, and prevented from sleeping, clocks stopped, and to touch certain objects in the house caused the fingers to tingle, and alarmed the residents.

Prof. Silvanus Thompson, in giving evidence, produced a phonograph, which was placed on the bench before his lordship to give a repetition of the vibration and jarring caused by the working of the defendants' machinery in premises adjoining Marylebone Station. The phonograph had been set in various rooms in the houses affected, and witness produced it in support of his statement of the results of his examination of them. On the instrument being put in position on the ledge of the witness box, his lordship quitted his seat, and, walking to the end of his "bench," held the tubes to his ears. Apparently satisfied, his lordship, after listening for a minute or two, returned to his seat and made, as usual, a short note of the "evidence."

Some New Dyes.

In a record of some new tinctorial products found in the *Moniteur Scientifique*, it is interesting to note the progress—at least the holophrastic progress—making in the nomenclature of the materials that industrial chemists are producing for the use of the dyer, and of the chemicals that serve for preparing the same. Thus we find that, under the name of metacyanotetramethylediamidotriphenylecarbinol, the Farbwerke, of Haecht-am-Main, have patented a yellow coloring material, while Messrs. Dahl & Co., of Barmen, have taken out a patent for a blue dye derived from tetraphenyletetramidodinaphtylemethane and for a substantive trisazoic blue-black dye derived from amidobenzolazonaphtylamine and naphtylenediaminesulphonic acid. The subject of a patent obtained by Dr. E. Bottiger, of Dresden, is a process of preparing acetylamidodiethylepyrocatechine. Finally, on account of its apparent simplicity, may be mentioned a process of preparing colors from triphenylemethane, invented and patented by Messrs. Cassella & Co., of Frankfurt-am-Main. It consists merely in oxidizing together dimethyle (or di-ethyle) dibenzylediamidodiphenylemethanedisulphonic, dimethyle (or di-ethyle) benzylethylediamidodiphenylemethanemonosulphonic and diethyledibenzylediamidodiphenylemethanemonosulphonic acids with diphenylamine, methylediphenylamine, ethyle diphenylamine, and m-methoxy- (or m-ethoxy) diphenylamine.

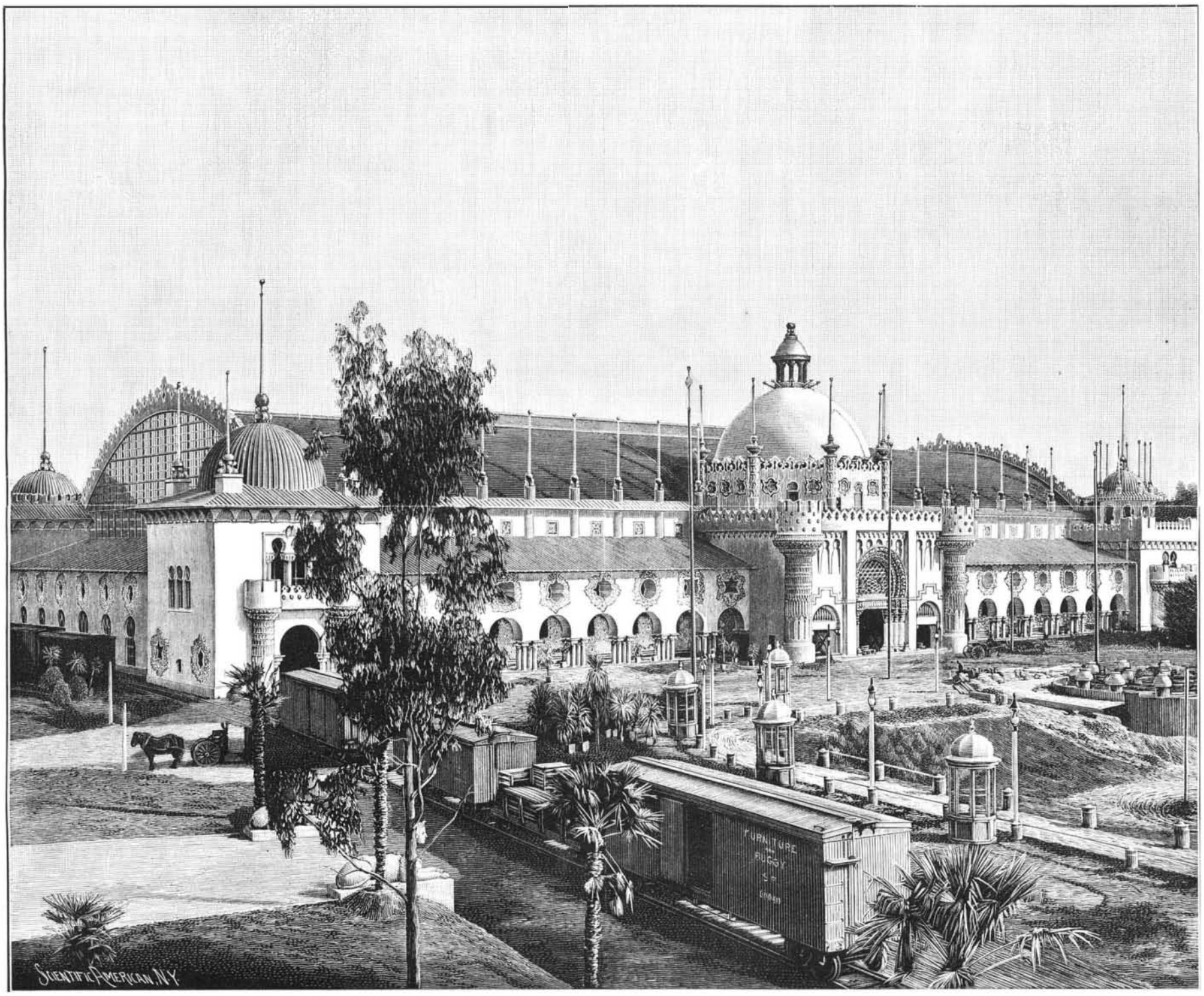
Corrosion of Pipes and Telephone Cables Due to Electrolytic Action.

Since the introduction of the trolley electric system, considerable has been said and written concerning the subject of corrosion of pipes, etc., by the return current of electricity used in operating the roads. The subject is a very serious one, when you consider the extent of damage done the water pipes, gas pipes and telephone cables by electrolytic action. The trouble lies in inability of the return circuit to carry back to the dynamo the current discharged through the car wheels. There are several systems used in operating trolleys, the most prominent of which is the single trolley system, where but one overhead wire is used for each track. More than 75 per cent of the roads operated in this way use the overhead wire for carrying the positive or outgoing current; but Mr. J. H. Vail, who is an authority on such subjects, in a paper read before the annual convention of the National Electric Light Association in Washington, D. C., last month, says: "The track system of all electric railways should really be the positive side or outgoing circuit. It will be readily understood that as the current travels from positive to negative, therefore any arc which occurs between the trolley wheel and the trolley wire will carry metal from the trolley wheel and deposit it on the trolley wire. If the reverse method of connection is made, the trolley wire will lose the metal, which will be deposited on the trolley wheel, and in time the strength and conductivity of the wire must be seriously impaired, eventually resulting in breakages." Some time ago a road in Boston changed from the former to the latter system for experimental purposes, finally deciding in favor of the overhead wire for the positive current. One year was devoted to each system.

In the positive overhead wire system the rails should act as a continuous conductor for carrying the discharged electricity back to the dynamo; but they fail, owing to improper connections at the rail joints. Leakages occur at these points even when a very heavy copper bond is used. Earth, especially when it becomes damp, acts as a conductor; consequently, when a leak age occurs at a rail joint, the electric current immediately takes to the ground, and the earth in the vicinity becomes charged with the current which was designed for the rails, and plays to a considerable extent the part of a return wire. Iron or lead pipes (which are better conductors than the earth) extending along the route below the surface become charged. This condition involves a discharge at some point, and here the electrolytic action is established, which, little by little, carries away the metal, or rather converts it into a compound which, in the moist earth, is readily detached. When this action is confined to a limited area, as at an abrupt bend in the pipes, the corrosion is rapid; but when it is distributed along a stretch of several hundred feet the destructive action is slower, but nevertheless constant and sure. Of course in some places electrolysis is more rapid than in others, owing to difference in the chemical composition of the earth. Several plans for correcting this evil have been tried, the best results so far obtained being from electrically welding the rails in sections of about two thousand feet. Rails of a new line soon to be constructed in the southern part of Brooklyn, N. Y., will be laid on this plan.—*Railroad Gazette.*

THE MIDWINTER FAIR.

The idea that was kept steadfastly in view in designing the buildings and in laying out the grounds of the Midwinter Fair was to obtain picturesqueness. The well macadamized highways wind in and out, flanked by pretty little Swiss chalets, kiosks, or State buildings. This seeming haphazard arrangement is really a triumph of art, and is a radical departure from the somewhat stiff and formal arrangement of the White City. The Midwinter Fair at no point resembles the dreary, sun-scorched, shadeless avenue of concessionaires—the Midway Plaisance. Of course, the Fair requires some large open space to admit of an effective architectural grouping of the larger buildings. This is afforded by the Grand Court, which replaces the world-famed Court of Honor at the late Columbian Exposition. In the center of the court is a rich growth of grass, which is separated from the buildings by a road sixty feet wide. On the inner side of the road is a row of vases bearing palms and other exotic plants.



THE MIDWINTER FAIR, CALIFORNIA—THE MANUFACTURES AND LIBERAL ARTS BUILDING.

The decorative effect of the Grand Court is heightened by fountains, statues, and a series of highly colored Venetian masts. When the search lights bring out the gorgeous colors of the brilliant hued domes and minarets, the effect is superb and beggars description.

Probably the first building to attract the eye on entering the Grand Court is the Manufactures and Liberal Arts building, so named from the huge prototype at the Columbian Exposition. The great blue dome and golden lantern glistens against the intense blue of the semitropical sky like an immense jewel, while a peculiar suggestion of age is given by the grayish-green tiles of the roof. This building is the largest structure at the Fair. The architect was Mr. A. Page Brown, and the style adopted is Moorish. The building is situated at the eastern end of the Grand Court and faces the Administration building. The main portion of the Manufactures building measures 462 by 225 feet, while the annex is 370 feet long by 60 feet wide, so that with a gallery in the main building, 35 feet wide, the total floor space is 177,000 square feet. Under the dome there is an additional floor, 54 feet from the

M. Jablochkoff.

A dispatch from St. Petersburg states that M. Paul Jablochkoff died April 5 at Saratoff. M. Jablochkoff, who was an officer in the Russian army, invented in 1876 one of the earliest successful electric lights. The invention, which was known as the Jablochkoff candle, attracted great attention at that time, and in 1877 it was used quite extensively in Paris for lighting stores and streets, but has since been superseded by the more economical arc light. In brief the invention consisted in placing two carbon pencils side by side insulated from each other by some substance which is non-conducting at ordinary temperatures but which will, when fused by the intense heat of the current, become a conductor of electricity. The substance usually used was plaster of Paris, which gives a faint rose color to the light.