Transportation - 1904 - St. Louis World’s Fair

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Of all inventions, the alphabet and printing press alone excepted, those inventions which abridge distance have done most for the civilization of our species” wrote Macaulay, and the dictum was most profusely illustrated and conclusively confirmed at the Exposition of 1904.

There had been transportation exhibits at all former Expositions, but the World’s Fair of 1893 at Chicago was the first to accord transportation the dignity of a great exhibit department. The exhibits there had been most instructive and inspiring, especially as they made a graphic presentation of the development of transportation on land and water from the "dugout" and bark canoe and the flatboat to the ocean-liner, and from the ox-cart to the “lightning express” train. The history of Louisiana Territory’s development was a history of rapid transition in an inventive age from canoe and barge to steamboat, and from pack-horse transportation in the wilderness to a network of steel railways that make Saint Louis nearer now to London, Paris and a hundred of the world’s greatest cities, than she was to the Ohio Falls in 1803.

The Louisiana Purchase Exposition marked the close of the first hundred years of the locomotive, and its present giant development from the first crude attempts was to be shown step by step, as a matter of course, at Saint Louis; and not only the progress made since 1893 in railroading and locomotive building, but in the invention of new motors and their successful application to transportation on land and water, on electric tramways and on common roads.

The common use of the bicycle began with the exhibition of the high wheel with solid rubber tire at the Philadelphia Exposition, in 1876. The safety wheel with improved gearing and pneumatic tire remained the latest transportation novelty at the Chicago World’s Fair of 1893. Not a single automobile was shown there, nor a single light pleasure boat propelled by any one of the new motors, now seen everywhere. These were all in evidence at Saint Louis in 1904, the display of 140 automobiles being” especially magnificent. Here also were witnessed the first successful nights ever made at an Exposition by a dirigible balloon, propelled by one of the new "Hercules" motors. Baldwin’s "California Arrow" did not succeed in capturing the grand air-ship prize, but its performance satisfied thousands of spectators that the problem of aerial navigation is on the verge of triumphant solution. And as to the show of locomotives, the one which at the Chicago Exposition held the record as the fastest passenger engine in the world, is now hauling" a milk train, its power and speed having" been far surpassed by larger engines of new types, untried a few years ago. The twenty-nine heaviest locomotives exhibited at Chicago had an average weight of 128,588 pounds, and the largest weighed 195,000. At Saint Louis twenty-nine locomotives averaged 195,239 pounds, and the largest weighed 393,012 pounds, light. One German high-speed engine exhibited at Saint Louis had a record of maintaining a speed of eighty-two miles an hour.
with a six-car train weighing 240 tons, eighty-seven miles an hour with five cars of 200 tons, and ninety-two miles an hour with three cars of 120 tons.

In accordance with the importance of its contents and their bearing on the commemorative purpose of the Exposition, the Palace of Transportation was the largest of all the exhibit palaces, excepting only the Agriculture building. It was 1,300 feet long and 525 feet wide, and under its roof there were four miles of railway track. Yet the exhibits largely overflowed that vast space. The motors and power generators used in electric railway transportation were installed in the Electricity building. A large out-door space was devoted to the German State Railways exhibits of tracks, terminals, signals and switches. Along the north side of the Transportation palace on a double track a quarter of a mile in length was another out-door exhibit of traction systems. The aeronautical exhibits were installed in the Aeronautic Concourse west of the Administration building, except one large balloon in the Palace of Transportation, exhibited by the Aeronautical Society of Berlin. The palace itself, even after Masqueray’s original design had been greatly modified to bring the cost down to $700,000, Was a massive, imposing and appropriately ornate structure, proclaiming its purpose in every feature. Everybody at first sight recognized it as the Palace of Transportation. At the east end of the building and extending across it was a gallery sixty feet wide, affording space for the offices of the department, United States customs officials guard rooms, and a reading room large enough to seat 500 people. Fitted up and maintained by the exhibitors and the Saint Louis Railway Club, this room became the meeting place of the annual convention of Roadmasters and Maintenance of Way Association, September 13-15; of the Chief Joint Car Inspectors Association, September 22; Railway Clubs, September 27; American Railway Mechanical and Electrical Association, October 10-14; American Street Railway Association, October 11-13; Wood Preservers Association, October 11; Railway Signal Association, October 11-12; Street Railway Accountants Association, October 13-15; Voluntary Relief Department of the Pennsylvania Railroad System, October 31; American Institute of Mining Engineers and British Iron and Steel Institute, November 5-7; Saint Louis Railway Club, November 12; Association of Engineers of Maintenance of Way, Pennsylvania Lines west of Pittsburgh November 17-18.

The Chief of the Department of Transportation exhibits was Willard A. Smith, editor and publisher of the Chicago Railway and Engineering Review, one of the leading weekly technical publications of the world. He held the same position at the Columbian World’s Fair and under the United States Commission to the Paris Exposition of 1900. The members of his Saint Louis staff were: Commander A. C. Baker, United States Navy, Assistant Chief; Percy Hudson, Superintendent Marine Division and Aeronautics; E. C. Finley, Superintendent Railway Division; L. L. Fest, Superintendent Vehicle Division.

The largest railway exhibits were installed by the Baltimore & Ohio, the Pennsylvania, the New York Central and Big Four, the Wabash, the Chicago & Alton, the Santa Fe, the Union Pacific and the Mobile & Ohio. They co-operated in such a way that their installations jointly included a complete historical presentation of the evolution of the locomotive and of the progressive development of railroad-, track-making, terminal facilities, bridges, and the latest improvements in all equipments and appliances used in the operation of up-to-date railroads.

Though not under the direction of the Transportation Department, there were two other testing-operations at the Exposition, one of which was closely related to the locomotive tests, and both had a direct bearing on transportation problems.

Congress had made two appropriations of $30,000 each for the construction and operation of a fuel-testing plant at the Exposition, under the direction of Charles D. Walcott, Director
of the United States Geological Survey, but had stipulated that the testing machinery and the coals and lignites to be tested should be furnished free of charge. On account of this stipulation the complete equipment of the plant with the requisite machinery was delayed until September. But at the close of the Exposition sixty-four carloads of coal for testing—had been received from Arkansas, Colorado, Illinois, Indian Territory, Indiana, Iowa, Kansas, Kentucky, Missouri, Montana, New Mexico, North Dakota, Pennsylvania, Texas, West Virginia and Wyoming—and boiler tests, foundry tests, coking tests, gas tests and briquette-making tests were made at the rate of several dozens of determinations daily. This work was all done under the direction of university professors and engineering experts, and in December, 1904, Congress made another appropriation of $25,000 for continuing the tests at the same place, with the same plant and staff.

An Electric Railway Test Commission appointed by President Francis planned a series of electric railway tests, approved by Professor W. E. Goldsborough, Chief of the Electricity Department, and by the American Street Railway Association, and these tests were made under the direction of four engineering committees in which the leading electric railway companies and electric manufacturing companies of the United States were represented. These tests, begun on or about August 1, were continued on the Exposition tracks and those of the Saint Louis street railways, and in their power plants, but were not completed, and were continued at North Anderson, Indiana, on the tracks of the Indiana Union Traction Company.

The London & Northwestern Railway, England’s largest railroad corporation, also made an interesting historic exhibit by showing the first royal private car ever built, the original saloon coach built in 1842, for Queen Dowager Adelaide, the widow of King William IV. This stage-coach on trucks, with its baggage boot in the rear, was only twenty-one feet long, and presented a strong contrast with the standard English sleeping car of today, and the model of the private car of King Edward VII. The Adelaide coach stood upon a model English roadbed of ninety-pound steel rails laid on seasoned Baltic ties with felt between rail and ties to prevent jolting.

Besides the railways already mentioned, the Chicago & Alton, the Wabash, Union Pacific, Missouri Pacific, Santa Fe, Missouri, Kansas & Texas and Mobile & Ohio, all had notable installations of improved rolling stock and equipment, automatic brakes, signals, terminals, interlocking switching systems, etc., showing marked progress in all lines since the World’s Fair at Chicago. There were experimental types of locomotives shown at Chicago that no one would think of, showing now. Of the thirty-standard-gauge locomotives exhibited at Saint Louis, all were of the most approved models, with tested improvements; fifteen for passenger service, thirteen for freight and two for switching; representing a very large increase in weight and efficiency over those installed at Chicago. Fifteen years ago 130 pounds of steam pressure were the highest allowable. At Saint Louis there were twenty locomotives, each capable of a steam pressure of 235 pounds. One of these, owned by the Burlington, hauled a train of 562 tons 202 miles in four hours and twelve minutes. The American Locomotive Works exhibited eight, the Rogers Locomotive Works three, the Baldwin Works twelve. There were two German and one from the shops of Henschel & Son at Cassel. The Pennsylvania exhibited a De Gahn four cylinder balanced compound, built in France by the Societe Alsacienne des Constructions Mechaniques. This was a passenger engine of the most approved and successful French type, and it was imported that it might be tested at all points in comparison with the most advanced American, English and German engines.

The displays of passenger cars, notably those of the Missouri Pacific, the Illinois Central’s steel frame side-door suburban coach, the Empire State Express, and the Pullman Vestibuled Sleeping Car trains, showed that great strides have been taken in recent years in providing for the comfort, pleasure and safety of the passenger. American railways have long led the world
in the luxury of their passenger equipments, and even so long ago as the Exposition of 1893 it was made plain that the accommodations offered to private citizens in this country on railroads were scarcely inferior to those provided exclusively for royalty in other countries. While there was less profusion of ornamentation and luxurious upholstery in the palace cars exhibited in 1904, there was a commendable simplicity of decoration and a marked increase in comforts; better provisions for warmth, ventilation and cleanliness. Electric lights were sunk in the window frames so that people might read after retiring to their berths. The chairs in the chair coaches revolved. The overhead racks were being superseded by baggage storage spaces under the seats.

The progress shown in freight cars exhibited a manifest tendency towards higher capacity, and, excepting refrigerator cars, towards steel construction wholly or in part. Of fifteen cars exhibited as samples of improved freight carriers, nine were entirely of steel and three of steel and wood combined. Besides ordinary freight cars, there were included logging cars, hopper dumpers, center and side dumpers and combination flat and hopper cars.

The numerous and instructive transportation exhibits of Austria, Belgium and Nicaragua were installed in their respective national pavilions; those of Argentine and Haiti in the Palace of Forestry, Fish and Game; those of China in the Palace of Liberal Arts; those of Cuba and Hungary in the Palace of Manufactures; those of Denmark and the Netherlands in the Palace of Varied Industries; New Zealand’s in the Palace of Agriculture. Brazil, France, Germany, Great Britain, Italy, Japan, Mexico and Siam, all had interesting and well fitted sections in the Palace of Transportation. Brazil exhibited saddles, harness, ambulances, models and photos of river craft, boat motors, railroad works, ship-building yards and the equipment of her city fire departments. France made a magnificent display of automobiles, carriages, cycles and their accessories and fittings; motors, saddlery and harness, with models, drawings, and photographs of railways, terminals, harbors, and steamship lines. The German section contained the interesting exhibits of the Hamburg-American Line, the North German Lloyd Steamship Company, the Bremerhaven ship-builders; the German railways, drawing’s and models of hanging railways, and automobile exhibits by Benz & Company of Manheim, the oldest automobile makers in the world, who patented the first car January 29, 1886. The British exhibits, besides those made by her railways, included models of steamships and docks installed by her great navigation and shipbuilding companies. Italy exhibited a Sicilian cart and horse and a collection of maps, drawings, models, photographs and pamphlets, illustrating the latest progress in railroad building and operation. The Japanese section occupied the southwest corner of the building, extending 200 feet east along the main aisle. It contained an immense horizontal relief map of the empire, including Formosa, and showing, harbors, postal and telegraph lines and steamship routes. There were also models of Japan’s splendid merchant marine and maps of their oceanic routes and much graphic illustration of Japan and her railways. The Mexican section contained a fine exhibit installed by Mexico’s War Department and also a great deal of fine Mexican saddlery and harness, photographs of steamships belonging to Mexican Navigation Companies and stereo views of Mexican railways. Siam’s many queer models, of coats, bullocks carts, elephant howdahs, bullocks and elephant harness, made her section exceedingly novel and interesting to untraveled Americans.

The display of vehicles by American and foreign manufacturers proved that even in machines which many generations of men have been perfecting, recent years have made great improvements, both in looks, lightness of draft and durability of running gear and material. Of course, in electric railway rolling stock there has been more manifest improvement since the first little trolley car was operated in Richmond, Virginia, in 1887, than in any other passenger conveyance.
Bearing upon the subject of transportation were the exhibits of road-making machinery, steam shovels for railroad construction, dump cars, excavators, and model highways. In the Palace of Liberal Arts were several displays of graders for highway construction, and huge steam rollers with which to smooth and pack the crushed rock and asphalt covering in the making of a modern street. In the Palace of Machinery a huge steam scoop of the clamshell type was in daily operation, picking up nearly a ton of earth with each plunge into the soil. The many styles of dump cars were shown in the Palace of Transportation. In the Municipal Street were samples of good roads, laid by the Good Roads Association. New Jersey, which has given much attention to the problem of good road construction, made an exhibit in the Municipal Street of forms of roads adopted in that State. The exhibit was full of instruction for those who are giving attention to this subject, which has an important bearing upon the welfare of established communities.

Various forms of rock crushers, used in the preparation of ballast for railroads and for the construction of improved highways were shown. New methods of cement construction with steel reinforcement for culverts, abutments and other work were demonstrated. Here were illustrations of reinforced concrete beams and concrete piling.

Many of the nations exhibiting at the Exposition showed, in some part of their exhibit, models of railroad bridges of latest forms of construction, which gave the inquirer an insight into what the world at large is doing in bridge engineering for railroad and highway purposes. Not the least interesting were the exhibits of electric locomotives, showing what definite progress has been made in this line of development. The original electric locomotive was exhibited in the Edison display. Here it was just as when first operated on his private experimental track at Memo Park, New Jersey, in May, 1880. The new inventions were the Hunt Storage Battery locomotive and the Baldwin-Westinghouse types.

In this wonderful age of invention and progress, when the utilities of to-day may be relegated to the scrap-heap to-morrow; when the earth’s vast distances are constantly shrinking before man’s ingenuity and space is being practically annihilated, the momentous changes that have taken place are given but little thought by the great public, which is the chief beneficiary of them. For instance, it is a far cry from the days of the old stage coach to the present period of electrically propelled palaces of travel, and how few there are who ever give a thought to the wonderful evolution that has meanwhile taken place in vehicular traffic, or credit to those few captains of the industry who, by their energy, skill and ingenuity, have produced the present high standard in the methods and means of street-car transportation, one of the elements of progress which has done its full share towards the upbuilding of the American Nation.

This story of street-car development which is so closely interwoven with the progress of the United States might be told in several volumes, perhaps, but it could not be better presented than it has been in the comprehensive historic exhibit which the Saint Louis Car Company, the greatest of all car-building concerns, had in the Transportation Building at the World’s Fair. No other company could have produced such a display, for the Saint Louis Car Company and its officers have been identified step by step with the evolution of the street railway car. The history of the one is in reality the history of the other. They have been inseparable.

The Grand Prize for excellency in the manufacture of street cars, trucks, seats, headlights, vertical wheel brakes (patented), spiral journal bearings, brass car trimmings, gray and malleable castings and other specialties, which was awarded the Saint Louis Car Company by the Louisiana Purchase Exposition, is but another of the many triumphs of this great concern.

Their display at the World’s Fair showed at a glance all that has been done for forty years or more in car building; and it
revealed, of course, that the greatest degree of excellence was the result of the firm's push and energy and inventive capacity within recent years. Formerly the idea uppermost in the municipal public mind as regards transportation was simply "get there." The means or method did not enter into the question at all. All that was required was that a horse or mule-drawn car should hold the rail. As time flew by and business increased with the growth of population, the demand for quicker and more comfortable facilities began to develop. How well the Saint Louis Car Company met these demands in the different periods of street railway construction, cannot be better illustrated than by the line of street cars, headed by the old Western stage coach, which constituted their display.

No contrast could be greater than that between the old coach and the present street-car palaces of to-day, and in fact the workmanship and material seen in the types of horse cars reveals the big improvement made over the old stage that bowled over mountain roads.

Next to the old coach in the exhibit was a horse car of the type first used. Its capacity was but twenty passengers, and while it filled a "long-felt want in its day, it was but a sorry specimen compared with the present substantial coaches that carry hundreds of persons. The car that is used on Cuban and Porto Rican plantations, and the first cable car ever put into service, are interesting in showing the first changes and improvements in construction.

Then there was an electric car only recently taken out of service, which, when it was built in 1887, was considered a model. Perhaps comparison between this and the coaches of to-day revealed the greatest improvement in all points of construction. After a glance at the "old timers" it was refreshing to turn to the model cars now used on the surface, elevated, underground and interurban railway systems. These types, combining durability with elegance and comfort and convenience, represented the class of work that the Saint Louis Car Company is now engaged in. They were not made for exhibition purposes by the builders, but were parts of orders already filled or being filled at the plant.

In this part of the modern exhibit was a type of car built for the Interborough Rapid Transit Company, of New York, one of two hundred ordered. This no doubt represented the acme of excellence in car construction. It was fifty-one feet long, almost nine feet wide and nine feet high. The body tapered, and the entire plan showed that it was designed to give the greatest seating capacity. The car was fireproof, being sheathed in copper. The interior finish was African mahogany, the seats ran crosswise in the center of the car, and longitudinally at the ends. Each coach was fitted with air brakes and other modern appliances and was heated with electricity. For easy running it could not be surpassed, as the trucks were of the swing bolster type, with solid forged frames.

Other cars in the same exhibit which revealed the wonderful capacity and perfect workmanship of the Saint Louis Car Company were a forty-six-foot combination motor and trailer built for the Northwestern Elevated Railroad Company of Chicago, and an unusually large and handsome interurban coach built for the San Francisco, Oakland and San Jose Railway Company, of Oakland, California. The former was mounted on No. 50 trailer trucks and had eight cross seats in the center, and the remainder of the longitudinal style. The Oakland coach was equipped with reversible seats and was mounted on the Car Company's interurban trucks No. 23B. The interior, which was richly finished, was illuminated with arc lamps, and the headlight was also of the arc type, both of which were specialties of the Saint Louis Car Company. It seated fifty-six passengers.

Perhaps the most interesting part of the exhibit to laymen, and maybe street-car men, was the various stages of street-car construction that were illustrated, from the lumber set up as it was finished in the woodworking department to the finished
product with all its appliances and burnishings. Reference to this exhibit would be incomplete were it to ignore what was without doubt the finest private car ever constructed for use on a street railway. It was built for John I. Beggs, of The Milwaukee Electric Railway and Light Company.

These are but a few of the striking artistic and useful evidences of the great enterprise located in Saint Louis, and every citizen of the city should feel proud that the Saint Louis Car Company leads and supplies the world with street cars. The plant where all this vast work is done is the largest and busiest in the country, and at the same time the most systematically operated. Its growth, like the street cars it manufactures, has been progressive. The first plant was but a speck compared with the monstrous one now in operation. The company’s great success has been due to the honesty of its product and the push and enterprise and skill of its officers and employees. That the best results might be obtained, the company has always made it a practice to look after the interests of its employees. The admirable relations existing between them has done much to promote the concern’s success. The employees take an interest in their work beyond that of earning a day’s wage. They always strive for something better for their employer’s good, and their loyalty and efforts are liberally rewarded. This spirit has enabled the firm and its men to keep abreast of the times in the manufacture of standard cars, and also to take the initiative in the creation of new types looking to the betterment of street railway service. The company employs three thousand men, and there is not so much as a nail or screw in the product that is not turned out in the plant. All upholstering, painting, molding, electric wiring, lamps and finishing are done in the various departments, so that every department has a hand in the construction of the cars.

The company was organized in 1887, and its growth for the first ten years was sure and steady. Mr. J. H. Kobusch was its founder. He was succeeded by his son, Mr. Geo. J. Kobusch. During the last six years the progress made has been so remarkable as to excite the wonder and admiration of all who have visited the mammoth works. That this company has grown so rapidly is, in a great measure, due to the systematic and up-to-date methods of manufacture and modern equipment, as well as a thorough knowledge and understanding of the requirements of the electric street car industry.

The original works of the company were located at No. 3000 North Broadway. It was an humble beginning, some two hundred and fifty men being employed at the time, and the capacity being between four and five hundred cars, average length about twenty feet. The work of the shops in the early history was distributed among three or four departments. To-day there are thirty distinct and separate departments, each one of which has a share in turning out the work from inception to completion. In 1898, new works were erected at Baden, a suburb located in the extreme northern part of the city. The present manufacturing equipment is the most modern that can be found anywhere. A comparison of the original works with the shops of the present day illustrates the expansion of the company more than mere words possibly can.

The capital stock of the company in 1887 was $25,000.00; in 1888 it was raised to $150,000.00; in 1894 to $500,000.00, and this latter amount was tripled in 1903, making the capitalization $1,500,000.00. In 1904 the capital was increased to $2,000,000.00. The sales of products in 1898 amounted to $601,478.10, while in 1903 the sales exceeded $5,000,000.00. In April of 1903 the Saint Louis Car Company acquired the Laclede Car Company of Saint Louis, by purchase.

Besides this there is a large output of trucks, the trucks of this company being noted for their easy-riding qualities, strength and durability. The Saint Louis Car Company also manufactures its own seats, arc headlights and arc lamps for interior car lighting; curtains, vertical wheel brakes (patented), spiral journal bearings, and many other specialties that are essential to an up-to-date, modern car. The company also oper-
ates its own brass foundry, where all brass and bronze trimmings are turned out, also a malleable and gray iron foundry. Manufacturing these specialties and material themselves has proven quite a factor in the meteoric career of this company, as it enables it to take large contracts and make quick deliveries.

The products of the Saint Louis Car Company are not only to be found in every State and Territory of the United States, but also in Germany, France, England, Russia, South America, Mexico, Australia, New Zealand, and other foreign countries.

The officers of the company are: George J. Kobusch, President; H. F. Vogel, Vice-President and General Manager; Geo. A. H. Mills, Secretary and Treasurer; W. B. Phelps, Assistant Secretary; E. I. Robinson, Manager Laclede Plant; Geo. L. Kippenberger, Purchasing Agent; Chas. G. Ette, Secretary Saint Louis Malleable Casting Company; Warner S. McCall, General Sales Agent, Saint Louis; Frank E. Huntress, General Eastern Agent, Boston, Massachusetts; Frank McCoy, Pittsburg Agent, Pittsburg, Pennsylvania; Gus Koch, Pacific Coast Agent, San Francisco, California; H. H. Boeker & Co., Remscheid, Germany, and A. S. Everest, London, England.

Recognizing the large field in this country for a perfectly designed and carefully constructed automobile, the Saint Louis Car Company decided upon the manufacture of this new and wonderful addition to vehicular traffic.

A new factory, specially built and adapted for turning out automobiles, has been added to their present mammoth works, already covering over fifty acres.

After a series of exhaustive tests of the best foreign motors, they were impressed so forcibly with the merits of the type automobile selected, that, believing it to be the best suited to meet successfully conditions in America, they purchased the American rights of this company, and are building a machine which they confidently expect will excel any of the present American makes in strength and durability. That same careful attention paid to details and high-class workmanship, which has earned for the Saint Louis Car Company a reputation for excellence and superiority in the manufacture of its products, enters into the construction of automobiles.

The Saint Louis Car Company enters the field under the most auspicious conditions, owing to the fact that they own and operate their own gray and malleable iron and brass foundries, and are, in consequence, able to obtain perfect castings for cylinders and other parts.

Another field but recently entered by the Saint Louis Car Company, and in which it has already been an assured success, is the manufacture of a steel-frame side-door steam passenger car, a sample of which was exhibited in its display at the Exposition, attracting great attention, owing to the new and novel features connected with it. It will construct the steel-frame side-door suburban car in addition to the regular class steam-railway coaches. In December, 1904, the Company secured the largest single order for steam-railway equipment ever let. It consisted of one hundred and thirty-seven coaches for the Harriman lines, distributed as follows: The San Pedro, Los Angeles & Salt Lake Railway will receive ten coaches, eight chair cars, ten baggage and eight postal cars; the Southern Pacific Railroad gets twenty-six coaches and fifty chair cars; the Oregon Railway & Navigation Company eight coaches and the Kansas City-Southern Railway Corn five coaches, four chair cars, four baggage and four postal cars. The Company also has under way ten coaches for the Pennsylvania Railway and two for the Saint Joe & Grand Island Railway Company.

In a general way the steel-frame side-door passenger car may be described as follows: It is adaptable for suburban, interurban and elevated service and its advantages are the same whether the motive power be steam or electricity. Its inferior is arranged with a row of bench-form seats, so placed in sections across the width of the car as to leave side and end aisles fol-
ollowing the walls around the entire interior, and section aisles between each group of seats; thus providing for an expeditious movement to any part of the car when necessary, or from one car to another, there being ordinary swinging doors at each end for the latter purpose. Ingress and egress to the car is by side doors, of which it has twelve on each side, or a total of twenty-four side doors to the car, which doors open opposite and directly in line with a section aisle. It will hence be seen that, the car being entered by these side doors from an elevated platform the height of the car floor, the passenger has, at the least, to take but a few steps from the platform to any of the eight seats directly in front of him that may be vacant, or at the most, in case the opposite seats are full, has the means of readily getting to the nearest vacant seat. The side doors are mounted at the top on ball-bearing rollers and slide in and out of the spaces in the walls of the car. The thresholds are flush with the floor, equipped with safety treads and grooved to receive the lower ends of the doors. The side doors are connected by mechanism concealed within the hollow walls of the car, and arranged to be operated in series by compressed air or by hand. The controlling mechanism is located at the ends of the car and is operated by the trainman. The mechanism is arranged so that the doors can be operated by either of two systems— that of the positive opening, closing, and locking of all the doors on a side at one time, or the closing, locking and unlocking of all the doors at one time, leaving the opening of such doors as are to be used to be done by the passengers from either the inside or outside of the car.

The bench-form seats are of an entirely new design, and as has been said, are arranged transversely in sections, each section seating eight passengers. They are constructed throughout of mahogany, with straight backs forty-two inches high, provided with swell panels for back rests. No upholstering is used. The seat bottoms of solid mahogany are of modeled form, mounted on trunnion bearings in front and supported on springs in the rear; each passenger having an independent seat separated from adjoining seats by short arms. There are twelve sections of seats, with two additional seats at each end of the car, making a total of one hundred seats.

The aisles between the seat ends and the walls on each side of the car are eighteen inches in width, and as they extend the entire length of the car, they connect with the end aisle, or vestibule area, and in addition to affording a passageway on both sides throughout the length of the train, give standing room in an emergency for two hundred people, thus making the emergency capacity of the car three hundred.

The unusual height of the side walls of the car has made it possible to carry the glass in the doors and windows to a height of six feet above the floor, thus giving an outside view to standing passengers without the necessity of stooping. Another convenient feature resulting from the use of side aisles is found in the arrangement of the roller shades and blinds in the windows and doors, which in their drawn position leave exposed a strip of the window glass ten inches high and extending the entire length of the car on the line of vision of the seated passengers, so that a clear view of the outside can be had at all times of the day without exposing the passengers to the direct rays of the sun.

Pintsch gas is used for interior lighting, the lamps setting about sixteen inches lower than is usual, to give a better distribution of light for reading. This arrangement is made possible by placing the lamps over the backs of the seats, one lamp of three burners being used for each section, and quite out of the way of passengers using either the side or cross aisles when entering or leaving the car. Ventilation is secured by adjustable sashes in the upper deck and by a sliding sash in the side doors.

A little consideration will make apparent the following advantageous features of this new style of car:
The idea ordinarily suggested by the term "side-door car" is that of a car divided into separate compartments in which the seats are arranged transversely from side to side of the car, with no communication between the compartments, access to which is provided by doors swinging outwardly from each compartment over the station platform. This style of car is still in general use in Europe and Great Britain, but offers no advantage over the end-door car used in America, as it is even slower in its operation. In fact, the disadvantage of the side-door car as used in England is so great that serious consideration is at this time being given there to the end-door car used in America as offering means of relief from the difficulties now experienced. The side-door car of the Illinois Central is quite unlike that used on English railroads, not alone in the details, but in the principles of its design. In the first place, the swinging door is discarded, and the danger to which passengers on the station platforms and in the car are exposed by doors opening unexpectedly when trains are in motion is eliminated. Instead of the swinging compartment doors of the English cars, each one of which has to be opened and closed separately, sliding side doors are used, which are operated and controlled by ingenious mechanism within the walls of the car, so that all the doors may be opened and closed together or separately, as occasion may require, by the trainman in charge of the car. This arrangement admits of the instant and perfect control of all the doors from either end and both sides of the car, effecting great saving in time over the swinging door method.

Next to the sliding door, the abolition of the interior compartments and the opening of side aisles are the most noticeable differences, affecting not only the appearance, but the use of the car. In English practice, when a train arrives, the passengers to take it must go along the station platform, looking first into one compartment and then another until vacant seats are found, thus consuming much time and greatly delaying the train. By the use of aisles extending the entire length on both sides of the car, as in the new cars, the passengers may enter at once any of the side doors, and if vacant seats are not found immediately at the entrance, they can pass along the aisles to other parts of the car; or, if necessary, through the communicating end doors of the vestibules to other cars where seats may be found; hence, the train meanwhile having resumed motion, no time is lost waiting for passengers to find seats.

It will thus be seen that while the English idea of a side-door is used, the method of its application is quite different; and, while utilizing the side-door principle, there is combined with it all the advantages of the central aisle peculiar to the American end-door car, thus producing a type of car having the advantages of both systems without their disadvantages, and of much greater seating capacity.

In this country, with the steadily increasing density of passenger traffic upon railroads having a suburban business, and particularly upon the elevated and subway lines handling a heavy metropolitan traffic, the limitations of the end-door cars have become too plainly apparent, as demonstrated by the unreasonable detention of trains at stations in discharging and taking on passengers during the rush hours of the morning and evening. These detentions have a material influence in diminishing the earning capacity of the properties, to say nothing of the inconvenience to the public occasioned by the inability of the lines to afford the requisite accommodations. The remedy usually applied of increasing the number of trains at such times does not afford the desired relief, for the reason that no improvement can thus be effected in the crowding of passengers at the ends of the cars, with the incidental surging, struggling efforts of many persons to gain immediate entrance through the narrow gateways and end-doors. The system is a defective one and must necessarily remain so, as it produces a concentration of passengers at the ends of cars and congests the passageways whenever the traffic becomes heavy, and the congestion continues to increase with the density of traffic until finally the blockade is complete and movement ceases.

The railway and electrical Juries, composed of some of the
ablest railway and electrical experts in the United States, awarded a gold medal to the Consolidated "Axle Light" as the best system of electric car lighting on exhibition at the World's Fair. This was to be expected, for the reason that this system of electric car lighting from the axle has been pronounced by the chief mechanical officials of nearly all leading railway lines as the cheapest to install and maintain and the most efficient system of electric car lighting ever yet devised.

This exhibit was a center of interest to railroad men because of the clear demonstration given of the simplicity and effectiveness of this method of providing light for all kinds of cars. A brief inspection usually convinced the most skeptical.

While the Consolidated "Axle Light" system has only been perfected in the past four years, yet so satisfactory is its efficiency and so manifold are its advantages over all other systems of car lighting that it is today in use on the best cars constituting the finest trains of most of the leading railway lines in the United States. It has been the electric lighting system used on the "Twentieth Century Limited" trains of the New York Central and Lake Shore & Michigan Southern roads since those trains first went into service almost three years ago, and it is today the electric lighting system in use on the finest and fastest trains of many of the great transcontinental lines between Chicago and California. In addition to this, nearly all official cars of railway companies, as well as all Pullman private cars, are equipped with the consolidated "Axle Light" system of electric lights and electric fans.

The most eminent and progressive railway officials in the United States concede that "Axle Light" is the coming light for all classes of railway passenger cars, and that it is only a question of a short time when it will entirely take the place of gas or oil lamps for car lighting.

For years it has been recognized that the correct principle for lighting passenger cars was by electricity with power taken from the car axle to light the car while in motion, storing the excess current in a battery to light the car while stationary; each car carrying its own electric lighting apparatus, so that no matter to what train the car may be attached or to what point the car may be sent, it will always have electric light, and is never dependent upon any extraneous source for its supply of light, as is the case with cars equipped with gas tanks, which are entirely dependent for gas upon stationary gas plants.

The Consolidated "Axle Light" equipment of electric car lighting meets all the requirements of an ideal and perfect system of electric lights for passenger cars from the standpoint of efficiency, economy and safety, to say nothing of the advantages of electric light over gas of any kind, as well as preference by the traveling public for electric lighting as the Twentieth Century method of lighting passenger cars. The principal parts of the Consolidated "Axle Light" system consist of a dynamo, suspended from the car truck and driven from the axle; a storage battery, hung in a suitable box underneath the car, and a regulator installed in any convenient location on the car.

This system carries the current direct to the lamps when the train is running over fifteen miles an hour, depending upon the storage battery for current only when the car is stationary or running slower than fifteen miles an hour, thus lighting the car with the least expenditure of power.

The regulation being automatic, the development of current is controlled to any degree required to keep the lamps supplied and the storage battery charged ready for service when required, insuring the highest efficiency from the storage battery and conducing to the durability of the batteries, as well as all other parts of the system. The regulation maintains a uniform voltage on the lamps, insuring the longest possible life for the lamps.

The means employed for transmitting the power from the car axle is the most simple and elastic ever yet devised, namely: by
the use of a flat rubber belt, which requires no special skill to apply it and which runs equally well under all conditions of weather. The dynamo is suspended outside of the end sill of the car truck, thus insuring perfect alignment of the armature shaft with the car axle. This method of suspension makes it easy to apply a simple and durable case for the belt in sections of the country where this is desirable.

The cost of maintenance of the equipment, on the basis of per car per annum, is insignificant when compared with the cost of maintaining any other system of car lighting, and the greater the number of cars equipped with "Axle Light" by anyone railway company the less the cost of maintenance per car. This is being constantly demonstrated by railway companies using a large number of "Axle Light" equipments, their employees easily becoming familiar with the mechanism and operation of the equipment.

The company owning the Consolidated "Axle Light" system of electric car lighting is the Consolidated Railway Electric Lighting & Equipment Company, Hanover Bank Building, Pine and Nassau Streets, New York City, with branch offices in Chicago, Saint Louis, Saint Paul, and Montreal, Canada. Its President is Mr. Isaac L. Rice, and its Chief Engineer is Mr. Patrick Kennedy, who is also the inventor of the "Axle Light" system, which is protected by United States and foreign patents. The other officers of the Company are Mr. J. L. Watson, Secretary and Treasurer, and Colonel Jno. T. Dickinson, Vice-President, who has charge of all negotiations for the sale of "Axle Light" equipments.

The exhibit of The Pullman Company in the Palace of Transportation was easily the most attractive and popular display in that department. The two magnificent trains deluxe, that stood side by side on the main tracks in the center of the building, were a revelation even to those somewhat accustomed to railway travel. To the thousands of visitors whose railroad experience had been limited, these splendid cars, through whose softly-carpeted and brilliantly lighted aisles the courteous Pullman porters conducted more than seven thousand persons daily, were a veritable fairyland, revealing unknown possibilities in luxurious travel, demonstrating how a journey, even to the ends of the earth, might be made with less discomfort than one would experience in a trip downtown in a street car.

By comparison with earlier types of Pullman cars, an inspection of these ten vehicles showed how rapid is the progress of railway architecture. Modern conveniences, unknown at the last century's end, are provided as lavishly as though they were ancient and indispensable institutions.

Especially was attention directed to the security which the Pullman traveler is justified in feeling, since, in spite of the long list of railroad wrecks, it is an adage with railroad men that the Pullman passengers always escape.

"But these are especially built cars, designed solely for exhibition purposes," was the quite natural comment of many skeptical visitors. Nothing could be further from the truth. Except that the names of the ten cars were chosen with especial reference to the Louisiana Purchase Exposition, and what it commemorated, the cars were in every way exactly the same standard types that are being used all over the country, differing not in safety, comfort or beauty, from those in which everyone who so desires is privileged to ride daily.

The main points of construction were alike in all the cars. In each the double diagonal wood floor was covered half an inch thick with monolith, to give it the most sanitary surface, in that it was non-absorbent, smoother and, therefore, more easily cleaned than a wooden floor. Over this cement compound the usual fine Wilton carpet was laid.

In decorating the interior, it was the aim of the company to obtain room-like effects, wherever this could be done consistently with utility. Therefore, mouldings and carvings were
avoided as far as practicable, and instead, beauty of material and design substituted for elaborate ornamentation. First in order in the five-coach Limited Train, came the composite buffet smoking car, "Jefferson." Twelve deep-leather-upholstered chairs invited the smoker, rivaling in luxurious comfort the lounge in an alcove off the same apartment. Conveniently adjoining this was a buffet, with a barber shop and white-tiled bath room annexed to it. A simplified treatment of the German "Modern Style," adapted to the structural outlines of the car, was used throughout the "Jefferson," the finely-grained " koko " wood being dark brown in color, with a conventional flower motif marquetry to lend color to the paneling. To blend harmoniously with this, the rest of the interior furnishings were of deep olive and brown, with which the side lamps, of burnished gold metal, contrasted effectively.

No less attractive was the second car, the diner " Monroe," although entirely different. Here the Flemish style prevailed; the richly-carved oak, stained an Antwerp brown, extended in a wainscoting to the lower deck, which was squared off, making the car seem like the dining hall of a palace. Leaded glass windows were set unusually high from the floor, but not so high as to interfere with the passenger's view. In this car, too, the lighting was unique, for besides the lamps in the ceiling, a small candelabrum branched over each of the ten tables, and antique lamps hung at intervals along the sides of the car.

From here the passenger walked into the sleeping car "Livingston," which contained twelve Pullman sections, a drawing room and state room en suite, with white-tiled annex and commodious toilet rooms. " L'art Nouveau " prevailed here in the interior decoration of vermilion wood from the Andaman Islands.

Fourth in succession, but equal in beauty, was the parlor car, in dark vermilion wood, the "Napoleon." The sense of luxury conveyed by its richly-colored upholstery was deepened upon trying its comfortable seats. The drawing room contained a wide davenport and two easy chairs, cushioned in old rose to match the satinwood finish of the room.

To complete this palatial train of cars was a fifth, the t( Louisiana," containing six communicating state rooms. Each compartment had its individual color-scheme and furnishings and its complete toilet appurtenances, each rivaling its neighbor in exquisite furnishings. Adjoining the last of these compartments was built the observation room, paneled in light vermilion wood to within eighteen inches of the ceiling, below which electric bulbs, fashioned like a cluster of flowers, shed a soft light.

Opposite this five-car "Limited" stood another train of equal length. Passenger coach " 1803," the first car of this train, finished in Mexican mahogany, was very different from what its number might suggest. No comparison could be made between its comfortable furnishings and those provided travelers a century ago. Thirty-six reversible seats upholstered in green plush, were provided for the comfortable accommodation of seventy-two passengers.

The second car in this train was named " 1903," and was similar in every respect to the " 1803 " except that reclining chairs took the place of the reversible seats.

On this train, too, a comfortable smoking-car was provided, which also was a cafe car. Six tables covered a space of twenty-six feet, while the usual pantry, kitchen and buffet, and a smoking room twenty-one feet in length, finished in "Moro" wood, filled the rest of the car. Square-beamed English oak ceilings and wainscoted walls, upon which side-lamps and candelabra hung, gave the dining-room a homelike and tasteful appearance.

Noteworthy, especially because of its comfortable accommodations, was the tourist sleeper "Mississippi." Except that the car lacked the rich decorations and upholstering of the more
palatial standard Pullman sleeper, it fulfilled in arrangement every desire of the traveler's heart.

The decorator practiced his art to the utmost in furnishing the private car "President," which formed the fifth car in this train and was a fitting climax to the display of modern luxuriance in travel. In the suite of three large private rooms, in the bath, observation and dining rooms, the arrangement was complete. Nothing was lacking, not even the shower in the white-tiled bath room. Each room contained a dresser, a wardrobe and every toilet convenience, so that a journey could be indefinitely continued in comfort. And with all this attention to conveniences, the beauty of the car was in no way neglected, so that the sumptuousness of it appealed even to the most fastidious.

SUCCESSFUL FLIGHTS OF DIRIGIBLE AIR SHIPS.

Wide public interest centered in the effort of the Exposition management to bring about some signal achievement in the navigation of the air. Large prizes were offered for various results, but the knowledge of aeronautics was proven to be not sufficiently advanced in America to secure the number of contestants that the management had hoped for. The aeronautic feature of the Fair was nevertheless intensely interesting on account of several successful flights of dirigible air ships. The grand prize which the Exposition offered was $100,000 to the person who would navigate an air ship over an L-shaped course not to exceed fifteen miles in circuit at a speed of at least fifteen miles an hour, returning to the point of starting.

The aeronautic concourse was on the plateau west of the Administration building and embraced about twelve acres, surrounded by a fence thirty feet high. Within the enclosure was an aerodrome, or balloon house.

Mr. Percy Hudson, an experienced aeronaut, was appointed superintendent of aeronautics by Willard A. Smith, the Chief of the Transportation Department, which embraced the aeronau-
$1,000, and miscellaneous $1,335.

The famous Berson balloon, with a record of seventy-five ascensions, exhibited by Germany in the Palace of Transportation, was a center of popular interest. It was while attempting to get out of this balloon on making" a heavy landing that Mr. Berson met his death, his foot catching in the netting and causing a fatal fall. The balloon was equipped with full scientific paraphernalia for tests and records in the upper air. One of these was a camera on a gunstock, enabling the operator to aim more accurately. Captain Von Tchudi, of the balloon corps, declined to permit a trial with the balloon at the Exposition, fearing that it might contain some defect after so much use, and being so old.

A very fine and complete model of the dirigible air ship invented by Henry Deutsch was exhibited in the French section of the Palace of Transportation. It was Mr. Deutsch who offered the 100,000 francs to the inventor of a successful dirigible air ship, which was won by Santos Dumont. Mr. Deutsch has now made another offer of 100,000 francs to anyone who will cross the ocean in an air ship.

Among the visiting students and experimenters in aeronautics during the air-ship tests was Professor S. P. Langley, Secretary of the Smithsonian Institution, who desired to enter for competition in the aeroplane experiments an engine invented by him, claimed to develop more power for its weight than any engine yet produced. But there was no competition of this sort.

The balloon race for the $5,000 prize attracted two aeronauts, George Tomlinson, of Syracuse, New York, and Carl E. Myers, of Frankfort, New York. The conditions were that the winner must land within 200 miles of the Washington Monument at Washington, D. C., and east of the western meridian of Ohio. The race took place on Liberal Arts Day, August 27th, but a contrary wind carried the contestants in a direction opposite from that which they wished to go.

Myers landed a few miles northwest of Saint Louis, near Saint Charles, and Tomlinson at Wyoming, Illinois, 200 miles away. The prize was not awarded.

Another noted visitor was Jaques Balsan, of the Paris Aero Club, a rich young bon vivier and celebrated aeronaut, who is trying to have Americans organize an aero club, with the view of future international tournaments in aeronautics.

The practical results to be attained in the aeronautic science are in the more general use of balloons for war purposes, balloon photography, the use of kites in photography.

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