Pittsburgh's development of industry and commerce, from 1850 to 1900, was unusually rapid. Contributive to these advances was Pittsburgh's frequent participation in domestic and foreign fairs and expositions. By having its products on display in Cleveland, Vienna, Boston, Allegheny, San Francisco, Philadelphia, New Orleans, Chicago and Paris at various times between 1852 and 1900, Pittsburgh, as one of the world's major industrial cities, tremendously enhanced its reputation. Largely influencing the prosperity of the "Iron City" were orders from foreign countries, whose agents saw Pittsburgh's products on competitive display with manufactures of other cities scattered throughout the world.

Cleveland, at Ohio's State Fair, in September, 1852, displayed many products of Pittsburgh. For outstanding quality of production, the following Pittsburgh firms took first premium after first premium:

- The O'Hara Glass Works
- Livingston, Roggen and Company
- Singer, Hartman and Company
- Heron and Criswell
- Mafett and Old
- Hall and Speer
- Nicholson and Payne
- Negley and Mahan
- M. Graff and Company
- James L. Reed and Company
- Cummings, Taliafero and Bless
- A. and D. H. Chambers
- Edwards, Morris and Company
- Campbell, Chess and Company
- Rhodes and Verner
- Pennsylvania and Ohio Mining Company
- Kennedy, Childs and Company
- Joseph Horne and Company

* Dr. Davis, dean of the college, at State Teachers College, Elizabeth City, North Carolina is author of "Pittsburgh's Negro Troops in the Civil War" published in the June, 1953 issue of The Western Pennsylvania Historical Magazine.—Ed.
Warner, Parks and Company
McKelvey and Blair

Pittsburgh’s exhibits at Cleveland were a wide variety of articles including specimens of Sheffield patent axles, vices, steel plows, plumbing appliances, gas fixtures, parlor and cooking stoves, shovels, spades, hoes, forks, surveyor’s instruments, door locks, latches, bell pulls, sash fasteners, copper and iron tacks and nails, brass water and steam cocks, flint and window glass, bituminous coal, cotton batting and yarns, cordage, twines, sheeting, woolen yarn and hosiery, and other items. On September 15 and 17, 1852 these exhibits had been transported to the Ohio State Fair free of transportation charges by the railroads. Messrs. McKelvey and Blair, awardees for the best cast and blister steel, received a silver goblet valued at thirty dollars, and for their wrought iron, machinery-made strap hinges, received a first premium and diploma.¹

Pittsburgh firms, represented in the Vienna Exposition of 1873, were the Atlas Iron Company, Jones and Laughlin, and Park Brothers and Company. As a reward for cold rolled shafting, Jones and Laughlin won a medal of merit. By July, 1873, the exhibit of Pittsburgh’s products at Vienna had induced contracts amounting to $9,000,000 in the “Iron City.”²

In 1874, two Pittsburgh firms, each participating in Boston’s Mechanics’ Fair were awarded a silver and gold medal.³ Meanwhile, merchants and manufacturers in western Pennsylvania had begun organizing for commercial advertising through the formation of the Allegheny County Tradesmen’s Industrial Institute, which was successfully to demonstrate the telephone, a novelty of Pittsburgh’s commerce, in 1878.⁴

On exhibit at the San Francisco Mechanics’ Fair, in 1875, was an ordinary, three-piece cast steel plow, without bolts made by the Pittsburgh Steel Casting Company. The parts of the plow dovetailed together.⁵

In October, 1875, $10,000 of Philadelphia’s Centennial stock was subscribed to in Pittsburgh for the opening of the fair in 1876.⁶ Twenty new passenger coaches were added to the Pittsburgh, Fort Wayne and

¹ Pittsburgh Daily Morning Post, Aug. 20, Sep. 21, 22, 1852.
² American Manufacturer, Mar. 6, 20, May 1, Jul. 3, Aug. 21, 1873.
³ Ibid., Nov. 19, 26, 1874.
⁵ Amer. Manufacturer, Aug. 26, Oct. 7, 1875.
⁶ Pittsburgh Gazette, Oct. 1, 1875.
Chicago Railroad for the Philadelphia Centennial. Among the collective exhibitors at the Centennial was Pittsburgh's Keystone Bridge Company, which displayed iron in various stages of manufacture from ore, as mined, to the finished product, as a highly ornamental bridge 27 feet long. Porter, Bell and Company contributed a light locomotive, generally novel, for the Centennial. There were the contributions of forty iron and steel and ten Pittsburgh glass firms. Pittsburgh's manufacturing firms, with keen insight, bought 480 copies of George H. Thurston's *Pittsburgh and Allegheny in the Centennial Year* to distribute among skilled foreign commissioners and mechanics at the Centennial. From Brazil, Cuba, Mexico, Canada, Continental Europe and Great Britain, orders increased for Pittsburg's manufactures. The Centennial display of Pittsburgh's products and low advertised prices, indeed, were the principal causes for these purchases. This had been a wonderful "eye-opener" for John Bull, for his "eyes" had been like "saucers." A. Speer and Sons, of the Globe Plow Works, with regular customers in Germany and South America, secured, in April, 1877, the patronage of the Centennial's Turkish commissioner. Shortly afterwards, two large lots of machinery were sold and dispatched to Cape Colony, Africa. Turkey and Cape Colony had been, to that time, British customers. W. W. Wood and Company, of Pittsburgh, received an order from England for locomotive jacket iron because the purchasers had seen Wood's iron on Centennial locomotives. Influenced by Pittsburgh's exhibits at the Philadelphia Centennial, European countries superseded black common iron locomotives abroad with planished iron engines.

In May, 1879, the Paris Exposition authorities awarded the Westinghouse Air Brake Company a gold medal, received by the Washington State Department. In 1889, George A. Macbeth and Company shipped a carload of glass lamp chimneys to Yokohama, Japan as a result of a first prize on Pittsburgh's glassware at the Paris Exposition.

The International Exposition, in 1884, at New Orleans pointed to

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7 *Amer. Manufacturer*, May 18, Oct. 28, 1875.
the possibility of extending Pittsburgh's commerce not only in the southern United States, but also to Mexico and South America. Western Pennsylvania, with its natural resources and diversified industries, had products to benefit by the development of such a commerce. In Pittsburgh, coal was an abundant article of commerce. Throughout the world, except in Pennsylvania and Brazil, there was no good merchantable gas or steam coal to be found. In all the coal markets only Brazil competed successfully with western Pennsylvania's coal, several thousand miles nearer to South America than English coal. Pittsburgh's coal could be delivered at New Orleans for ten cents per bushel. The coal men of Pittsburgh, therefore, concentrated their interests at New Orleans. Coincidental with these long range plans, Pittsburgh's Keystone Bridge Company constructed the New Orleans World Exposition's Mexican building.16

The Pittsburgh Exposition Society, organizing and sponsoring its first fair in 1875, succeeded the Tradesmen's Industrial Institute. Success was phenomenal.17 E. M. Butz, of Allegheny, was the architect of the Pittsburgh Industrial Exposition Building.18 Main Hall, 600 feet long by 150 feet wide, comprised spacious galleries, entirely filled with exhibits. Power Hall, 250 feet long by fifty feet wide, was also full.19 Exhibitors' allotted space was decreased several times to make room for new comers. Even then other prospective exhibitors were turned away because of a lack of space to place their exhibits on display.20 The exposition opened with a huge street parade, and the crowds, passing through the exposition's doors, were immense.21 Charles Gearing received a first premium for the best smoke consumer and fuel saver. As a result of the city's first exposition, England ordered samples of Pittsburgh's hardware. Advertisement of local manufactures through expositions was found to be profitable.22 Messrs. Klein, Logan and Company, diploma awardees at the exposition for picks, mattocks, and sledges,

16 Ibid., Sep. 5, 1884; Chamber of Commerce of Pittsburgh, Pittsburgh and Western Pennsylvania: Their Industries and Commerce, Resources and Prospects (Pittsburgh, 1885), 31. Coal could be delivered at New Orleans for $2.60 per ton.
17 Pittsburgh Commercial Gazette, Oct. 3, 1883.
18 Amer. Manufacturer, Apr. 15, 1875.
19 Ibid., Oct. 28, 1875. The Main Hall of the Pittsburgh Exposition Society was erected by the Tradesmen's Industrial Institute.
22 Amer. Manufacturer, Nov. 18, Dec. 16, 1875.
received orders from foreign markets and eastern and western states.\textsuperscript{23}

Immediately following predictions of long success scandal threatened the city’s exposition society. Some of the officers were expelled for the misappropriation of funds. The Centennial in Philadelphia, in 1876, overshadowed the city’s second exposition. Debts on the building were taken to the sheriff for settlement. After a year under new management, the city’s exposition society grew in favor. The state’s fair was held at the Pittsburgh Exposition Society’s buildings for two years. Main Hall, with a main tower of 100 feet, was a substantial frame building of the American Bane style of architecture. Marring the beauty of the grounds Machinery Hall’s furnace steam and smoke obscured the view of the main building from the entire river front of Pittsburgh. Machinery Hall, moved to the corner of South and Grant Avenues and occupying a foundation of 170 by 130 feet, was completed during the summers of 1879 and 1880. Between Machinery Hall and the main building was that delightful retreat known as Floral Hall, 130 by 85 feet. On the south side of Machinery Hall was an annex, thirty by 85 feet, besides the boiler room, forty by fifty feet.\textsuperscript{24}

The Sixth Annual Exhibition of the Pittsburgh Exposition Society and twenty-ninth exhibition of the Pennsylvania State Agricultural Society opened to the public on Thursday, September 7, 1882. The departments of art and science, among others, were fully represented, and the buildings and grounds were illuminated at night with electric light. Grand concerts were given every afternoon and evening by the Great Western Band.\textsuperscript{25}

At about two o’clock in the morning on October 3, 1883, Machinery Hall of the Pittsburgh Exposition Society burned to the ground amid excitement and panic. At dawn the remains of some of the best machinery ever manufactured in Pittsburgh were down among the piles that had supported Machinery Hall. The Old Arabian, the Baltimore and Ohio engine which had run for many years, was burned to ruination. Around it were about fifty smashed agricultural and electric engines, wire fence equipment, and all the iron work in Machinery Hall. The worst damage was to the great Stephenson, a street car. In the rear of the building the steps leading to the grand stand, one of the uprights that had supported the roof and part of the base ball back stop were left

\textsuperscript{23} Ibid., Dec. 16, 1875.
\textsuperscript{24} Pittsburgh Commercial Gazette, Oct. 3, 1883.
\textsuperscript{25} Amer. Manufacturer, Sep. 1, 1882.
intact. Untouched by the fire were all of the buildings, including the stables, east of Main Hall.26 The fire represented an actual loss to the exposition society of $201,000.27

In 1889, the city's exposition society, showing again for the first time after the fire of 1833, received a net profit of $59,000.28 Many novelties, in 1898, were presented in Mechanics' Hall. A printing and stamping box making machine; a model of a smokeless powder mill, similar to that used by the government in the Spanish-American War; a pullman palace car compartment, gas engines, automatic pumps and electrical machinery of every description were displayed. Indeed, the electrical exhibit surpassed every similar thing previously seen in Pittsburgh. Other attractive features of the exposition were the demonstration of submarine mine operation by a professional deep sea diver29 and an interesting display of the Firth-Sterling Company, manufacturers of the government's naval steel projectiles.30

In 1883, among the locomotives exhibited at the Chicago Exhibition was one of H. K. Porter and Company's logging railroad engines.31 In 1893, a year of national financial distress, Pittsburgh was continuing its participation in fairs without evidence of the slightest monetary interference. In Chicago's World Columbian Exposition, of 1893, Pittsburgh popularized two major items of commercial value dating from and primarily stimulated by this fair: the Ferris wheel and the alternating current electric lighting system.

After words of commendation at a banquet in 1892, the Chicago fair works director complained that the engineers and architects had suggested nothing novel or original for the fair in engineering science comparable to the Eiffel Tower at the Paris Exposition of 1889. Sensitive to this rebuke to his profession, G. W. G. Ferris, president of a Pittsburgh bridge construction company, conceived and worked out the first Ferris wheel design, coldly received by the other engineers of the Chicago Exposition. Spending $25,000 on plans and specifications, Ferris persisted until he obtained his concession in December, 1892. Afterwards, a joint stock company was organized for the construction of

27 Ibid.
29 Amer. Manufacturer, Sep. 16, 1898.
30 Ibid., Sep. 16, 1898. This was the tenth annual season of the exposition.
31 Ibid., Jun. 8, 1883.
the Ferris wheel.\textsuperscript{32}

On March 20, 1893, ground was broken for the foundations of the Ferris wheel, and three months later the completed wheel began to revolve. About midway in the recreation grounds stood this conspicuous mechanical wonder of the fair, the Ferris wheel, which was to the Columbian Exposition what the Eiffel Tower, in the Champs de Mars, was to the Paris Exposition of 1889. The structure consisted of two wheels, about thirty feet apart and connected by iron rods and struts, twenty feet from the periphery.\textsuperscript{33} The wheel, 320 feet in circumference and thirty feet in width at the outer rim, rose from a platform raised 15 feet above the ground. The rim of each wheel was composed of a curved, hollow frame of iron, containing another wheel with a lighter frame. In the center of the circle was the iron axle on which the wheel nearly three feet thick and 45 feet in length, turned. Resting on a pyramidal framework at either side, the wheel was held together by pairs of steel rods, 13 feet apart, from the axle to the circumference. Viewed at a distance, these rods appeared like spider webs. The interior portion of the wheel was constructed as in a bicycle, but hung by its axle instead of resting on the ground.\textsuperscript{34} Furnishing motive power for the Ferris wheel, a steam engine and other machinery resembled that of a cable car powerhouse.\textsuperscript{35}

Ascending a broad staircase, passengers passed through a doorway into a cheerful looking apartment with rows of revolving chairs on either side and plate glass iron-barred windows. Thus, passengers entered the first Ferris wheel cars, 36 in number, each of iron wood-covered frame, 27 feet long, 13 feet wide, nine feet high, with a loaded weight of 13

\textsuperscript{32} Hubert Howe Bancroft, \textit{The Book of the Fair An Historical and Descriptive Presentation of the World's Science, Art, and Industry, As Viewed Through the Columbian Exposition at Chicago in 1893 Designed to Set Forth the Display Made by the Congress of Nations of Human Achievement in Material Form, So as the More Effectually to Illustrate the Progress of Mankind in All Departments of Civilized Life, II} (Chicago, 1895), 882.

\textsuperscript{33} Ibid., 868-69; \textit{Pittsburgh of Today Proud of Her Glorious Past Peering with Confidence into Her Brilliant Future. Today the Most Prosperous City in the Union. A Review of Her Phenomenal Progress, Incomparable Industries and Remarkable Resources}, N. D., 212. \textit{Amer. Manufacturer}, Apr. 7, 1893: The Kepp Gear Wheel Company, Allegheny, shipped to the Pittsburgh Construction Company, Chicago, two gear wheels, each 12 feet in diameter and 20,000 pounds in weight. These were for the observation wheel which the Pittsburgh Construction Company were building at the World's Fair.

\textsuperscript{34} Bancroft, II, \textit{op. cit.}, 869.

\textsuperscript{35} Ibid.
tons and seating accommodations for forty passengers. Presently was heard the click of a latch, and with a slight creaking sound and gentle swaying motion, the cars started on a trip of twenty minutes. In each compartment was a conductor, who, by calling attention to elevated views of the fair, distracted passengers from being absorbed in fears of falling. Otherwise, there was nothing to frighten anyone.

The Westinghouse Electric and Manufacturing Company's machinery, installed in Machinery Hall at the Columbian Exposition, consisted of the great power plant used for lighting the exposition's buildings and grounds. In the collection of appliances for arc and incandescent lighting, prominence was given to alternating current lighting apparatus.

In the late 1880's the transmission of large blocks of power on the low voltage three-wire current system, then largely prevalent, was commercially limited to a distance of one or two miles because of an enormous consumption of copper. During the summer of 1885 George and Herman Westinghouse, at home in Homewood, noticed an account of the invention of a converter or transformer by two Englishmen, Gaulard and Gibbs. With the use of this invention, alternating current was regulated in voltage so that high voltage alternating current could be distantly transmitted while low voltage alternating current was distributed for utilization. George Westinghouse's imagination was stirred by the transformer's similarity to his system for transmitting natural gas and recognized the possibility of distantly and safely transmitting electricity through small wires to consumers. Individual transformers and transformer substations obviated the need for many generating stations and made electricity satisfactorily and commercially available to suburban and scattered districts. Westinghouse commissioned Guido Panta-leoni, an engineer employee on vacation in Europe, to purchase the invention. In the fall of 1885, Westinghouse secured the first alternating current dynamos and transformers from Europe. Reginald Belfield, a co-worker of Gaulard and Gibbs, came to Pittsburgh from England to demonstrate the new inventions. With the assistance of Belfield and others, Westinghouse experimented to achieve a commercial use of elec-

36 Ibid.
37 Ibid.
38 Ibid., I, 408.
tricity. The result of this beginning was the organization of the Westinghouse Electric Company and the announcement of a new electrical system early in 1886.\(^40\)

At this time it appeared certain that the future of outdoor and indoor lighting would be taken care of by the direct current arc and low voltage constant potential systems, respectively.\(^41\) The standard transformer consisted of primary and secondary windings, the first of which induced electric current in the second through the iron core's magnetic action. The primary and secondary circuits were each separately insulated from the core so that the circuit had no electrical connection with the high voltage transmission circuit. Westinghouse believed that adequate insulation was merely a matter of engineering design and construction.\(^42\)

Manufacturing fifty volt incandescent lamps for his system under the Sawyer-Mann patents, Westinghouse, after securing the Columbian Exposition's lighting concession, was opposed by the Sawyer-Mann patent owners of an Edison lamp. The cheapest means of bypassing competitive interference was to develop a new technique for removing the last traces of oxygen from electric light bulbs. Despite tremendous risks of failure, Westinghouse, engaging in successful scientific research, secured enough vacuum lamps to meet the Columbian Exposition's deadline date.\(^43\) In March, 1893, the Westinghouse Company had shipped nine of the large dynamos for the Chicago World's Fair, and the other three were to be shipped within a month.\(^44\) The so-called "stopper lamps," saving money to consumers, continued to compete with the Edison patent electric light bulbs. Alternating current electricity, resulting in the expansion of the Westinghouse Electric and Manufacturing Company was practically secure.\(^45\) The Westinghouse exhibit at the Columbian Exposition was the first demonstration of a complete system of electrical generation, transmission, and utilization for all types

\(^{40}\) Ibid., 16.
\(^{41}\) Ibid., 15.
\(^{42}\) Ibid., 17.
\(^{43}\) Ibid., 18-20.
\(^{44}\) Amer. Manufacturer, Mar. 24, 1893.
\(^{45}\) Ibid., 20-21.
of service, direct and alternating, ever shown.\textsuperscript{46}

Among the Pittsburgh firms awarded medals in the Transportation Department of the World’s Columbian Exposition were:\textsuperscript{47}

- Schoen Manufacturing Company, pressed steel sundries
- A. French Spring Company, locomotive and car springs
- Morris Box Lid Company, steel journals for locomotives
- H. K. Porter, light locomotives
- Westinghouse Airbrake Company, airbrakes and train signalling apparatus

Pittsburgh’s coal industry was represented at the World’s Fair by a miniature of the W. W. O’Neil, one of the largest nineteenth century towboats afloat on American rivers. The twenty barges of the W. W. O’Neil had carried many thousands of bushels of Pittsburgh’s coal. The exposition’s model of a boat and barges, 12 feet long and three feet wide, was made by John C. Fox, of Sunshine, with a penknife.\textsuperscript{48}

Awards were given by World’s Fair judges to the following Pittsburgh exhibitors: Mining Oil Well Supply Company, for domeless boiler, well drilling tools, and working models of drilling rigs; H. C. Frick Coke Company, for foundry and crushed coke; Pittsburgh Crushed Steel Company, for crushed steel and steel emery; George A. Macbeth, for glass and glass manufacture; Star Encaustic Tile Company, for plain and encaustic floor and hearth tiles; Sterling Steel Company, for steel armor projectiles; Crescent Steel Company, for mining drill steel, fractures of steel, steel dies, and compressed and polished drill rods; W. Dewees Wood Company, of McKeesport, for iron and sheet plates; Singer, Nimick and Company, for steel; Pittsburgh Reduction Company, for a collective exhibit showing the metallurgy of aluminum; and the Standard Manufacturing Company, the highest awards,

\textsuperscript{46} \textit{Ibid.}, 13, 21. The \textit{Amer. Manufacturer}, Oct. 30, 1896, points out the fact that an order was received through the Paris branch, for a 1,200 horsepower engine, similar to those exhibited by the Westinghouse Company at the World’s Fair, indicated that some features of the great exposition made substantial and lasting impressions on foreign visitors to the states. The engine was for an electric light station.

\textsuperscript{47} \textit{Amer. Manufacturer}, Oct. 6, 1893. The issue of March 17, 1893, tells of the air brakes and fixtures valued at $10,000. The air signal designed for passenger trains was designed to attract foreign railroad engineers or manufacturers. The issue of Apr. 7, 1893, explains that five of Porter and Company’s light locomotives of various styles were shipped. The smallest size, operated by compressed air and used ordinarily at steel mills, was termed the \textit{Midget}.

\textsuperscript{48} \textit{Ibid.}, Apr. 14, 1893.
four in number, for bath tubs, holloware, Plumbers’ ironware and sanitary goods.49

Pittsburgh's commercial and industrial advances, spearheaded by successful advertising in outstanding fairs in the 1890's projected unlimited skills in scientific research and technology. Twentieth century Pittsburgh was emerging with industrial efficiency and pride. At the National Export Exposition of Philadelphia, in 1899, the Crescent Steel Company's exhibit, including all kinds of fine steel tools, dies, forgings, springs, and similar articles was awarded highest honors. In this award was a silver medal and diploma. The company planned to forward their Philadelphia exhibits to France in time for the Paris World's Fair of 1900.50 For this fair at the turn of the century, the Westinghouse Electric Company equipped the movable sidewalk at the exposition and the electric railway on the exposition's grounds.51 The Pressed Steel Car Company shipped its Paris Exposition exhibit of five steel cars with a carrying capacity of from 40,000 to 110,000 pounds. A dozen employees of the company were sent to Paris to assemble the car parts into the finished products and to tend them during the exposition. There was also sent a number of samples of side stakes, center posts, body and truck bolsters, and three large water colored drawings showing the different parts of the firm.52

Thus, Pittsburgh in 1900, after almost fifty years, continued to display its industrial manufactures, indicators of material progress. World civilization benefitted by the city’s productivity. Commercial items, originating in Pittsburgh and appearing in fairs and expositions for the first time, were made available in abundance. Economic prosperity provided the luxuries otherwise impossible to obtain. The city of Pittsburgh, from 1852 to 1900, contributed a fair share in the nation’s change from iron to steel and from candle light to electricity. Climaxing a half century of industrial development, Pittsburgh, represented in fairs and expositions, secured a coveted capacity for technical research and mechanical production. Nineteenth century America easily may have been described by making examples of the achievements of the “Iron City.”

50 Ibid., Dec. 7, 1899.
51 Ibid., Apr. 28, 1900.
52 Ibid., May 10, 1900.