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Out

Report on the Section of Transportation and Engineering
in the U. S. National Museum, 1893.

By J. Elfleth Watkins, Honorary Curator.

(This report was not printed.)

During the first quarter of the fiscal year, the duties of the Curator, while Assistant-in-Charge of the Library of the Smithsonian Institution, engrossed so much of his attention that little time could be given to the work in the section of Transportation and Engineering. On October first, 1892, the Curator, at the invitation of the Pennsylvania Railroad Company, and with the consent of the authorities of the U.S. National Museum, took charge of the work of organizing and collecting the historical and technical exhibit made by that Company at the World's Columbian Exposition, and this work engrossed almost his entire attention until the close of the fiscal year.

P. 6. ~~There were 31 entries made in the catalogue of the department during the year, embracing 37 specimens.~~
Exhibits sent to the Columbian Exposition.

By the request of Messrs. Wyckoff, Seamans and Benedict, the depositors, the valuable collection of early Remington typewriting machines including the Danish "Malling-Hansen typewriter or writing ball", the "Sholes and Glidden" model, invented in 1876, and the first machine in which the double type-bar was used, were lent to the U.S. Patent Office for purposes connected with the World's Columbian Exposition. The model of the locomotive "Old Ironsides"

was also lent to the Patent Office, for duplication. The locomotive "John Bull" was temporarily reclaimed by the Pennsylvania Railroad Company, and after being overhauled, made a successful trip to Chicago, under steam, drawing two passenger cars, ^{of the type of 1836,} (See plate A), and was placed upon the track south of the Pennsylvania Railroad ~~Exhibit~~ Building in the World's Fair grounds, where its peculiar form and antique mechanism attract marked attention.

The original bill of lading for the shipment of the locomotive "John Bull" from Liverpool, dated July 14, 1831, was found among the archives of the Camden and Amboy Railroad, and placed upon exhibition in the building nearby. A reduced facsimile is reproduced above. (~~Text Figure #1~~ ^{Fig. 1}). The bill of lading shows that the locomotive was shipped by the ship "Allegheny", for Philadelphia, by Francis B. Ogden, agent in England for the Camden and Amboy Railroad Company.

A financial statement rendered that Company by Mr. Ogden, shows that Stephenson and Company were paid £ 784: 7s — about \$3,800.00 — for this locomotive.

The following extract relating to the locomotive "John Bull", slightly amended, is taken from an address delivered by the Curator, upon the completion of the Railroad Monument at Bordentown, N.J., November 12, 1891:

"Mr. Robert L. Stevens, President and Chief Engineer of the
"Camden and Amboy Railroad Company, while in England in the fall of

Smalley

"1830, divided his time between arranging for the manufacture of
 "track and examining the English locomotives, that were being con-
 "structed, or had been in service. A year had elapsed since the
 "opening of the Liverpool and Manchester Railroad, and the English
 "merchants had not been idle. The "Rocket", although successful
 "in the Rainhill contest, when put to work had shown many defects,
 "that Stephenson and Company were striving to correct in subsequent
 "locomotives. The "Planet", built by that firm, was first tried
 "in public December 4, 1830, shortly after Mr. Steven's arrival in
 "England, and at that time was undoubtedly the best locomotive in
 "the world.

Smalley
 "Mr. Stevens was present at a trial when the "Planet" showed
 "most satisfactory properties, and he at once ordered a locomotive
 "of similar construction, from the same manufacturers, for the Camden
 "and Amboy Railroad. This engine, afterward called the "John Bull"
 "and "No.1", was completed in May, 1831, and shipped by sailing ves-
 "sel to Liverpool, from Newcastle-on-Tyne, in June, and from Liver-
 "pool by ship "Allegheny", July 14, 1831, arriving in Philadelphia
 "about the middle of August of that year. It was transferred to
 "a sloop at Chestnut Street wharf, Philadelphia, whence it was taken
 "to Bordentown.

"The engine originally weighed about ten tons. The boiler was
 "thirteen feet three inches long, and two feet six inches stroke.
 "There were four driving wheels, four feet six inches in diameter,
 "arranged with outside cranks for connecting parallel rods, but ow-
 "ing to sharp curves on the road these rods were never used. The

"driving wheels were made with cast-iron rods and wooden (locust) "spokes and felloes. The tires were of wrought iron, three quarters of an inch thick, the tread being five inches, and the flange "one and a half inches. The gauge was originally five feet from "center to center of rail. The boiler was composed of sixty-two "flues, seven feet six inches long, two inches in diameter; the "furnace was three feet seven inches long, and three feet two inches "high, for burning wood. The steam ports were one and one-eighth inches by six and one-half inches; the exhaust ports, one "and one-eighth by six and one-half inches; grate surface, ten feet "eight inches; fire box surface, thirty-six feet; flue surface, two "hundred and thirteen feet; weight, without fuel or water, twenty-two thousand four hundred and twenty-five pounds. After the "valves were in gear and the engine in motion, two levers on the "engineman's side moved back and forth continuously. When it was "necessary to put the locomotive on the turntable, the enginemen, who "were skilled in the handling, first put the valves out of gear by "turning the handles down, and then worked the levers by hand, thus "moving the valves to the proper position and stopping the engine "at the point desired.

"The reversing gear was a very complicated affair. The two "eccentrics were secured to a sleeve or barrel, which fitted loosely "on a crank shaft, between the two cranks, so as to turn freely. "A treadle was used to change the position of this loose eccentric

Small type

"sleeve on the shaft of the driving wheel (moving it to the right
 "or left), when it was necessary to reverse. Two carriages were se-
 "cured firmly to the body of this shaft (one on each side of the
 "eccentric); one carrier worked the engine ahead, the other, back.
 "The small handle on the right side of the boiler was used to lift
 "the eccentric rod (which passed forward to the rock shaft on the
 "forward part of the engine), off the pin, and these put the valves
 "out of gear before it was possible to shift the sleeve and reverse
 "the engine."

The depletion of the section ^{by} ~~at~~ the removal of objects for ex-
 hibition at Chicago, and the transfer of the Weems electric motor,
 (that made fastest speed on record by generated power on land), to
 the east front of the Museum, necessitated a rearrangement of the
 north side of the ~~Section~~. The series illustrating the develop-
 ment of the American Rail and ~~Track~~, was transferred to the space
 made vacant by the removal of the "John Bull" locomotive. In my
 absence, under the direction of Miss Atkinson, cases containing
 rail sections, and the collection of early telegraph and telephone
 apparatus, have been newly lined and the specimens rearranged. In
 fact, nearly all the cases have been cleaned, the specimens re-
 arranged, and labels supplied, where necessary. All articles on
 exhibition, not in cases, have been furnished with new labels,
 framed and glazed, to protect them from the dust. New mats have
 been made for a number of photographs and engravings in the wing
 frames; they have also been relabelled with printed, instead of
 type-written labels. The snow-shoes and sledges, formerly resting

upon the tops of cases, have been ^{arranged} installed on the ~~South Wall~~,
 where they can be seen to better advantage.

There were 31 entries made in the catalogue of the department during the year, embracing 35 specimens.

Historical Exhibit of the Pennsylvania Railroad Company.

It is the purpose of this exhibit to perpetuate the early history of the Pennsylvania Railroad, originally a state work, and of the Eastern, ~~Western~~ and ~~Southern~~ lines merged into or associated therewith, which were pioneer steam roads in several of the fourteen states in which the 7980 miles comprising this immense system are located. The exhibit was installed in a handsome building of Greek architecture, ^{it} containing a well lighted exhibition hall, one hundred feet long and forty feet wide, which was erected south of the annex to the Transportation Building. For ground plan of the exhibit, see ~~Plate B~~ *Plate C* ^(see Plate B)

The exhibit of relics, models, drawings and other illustrations, is divided into ten series, illustrating —

- I. - The Development of the Locomotive and Rolling Stock.
- II. - The Development of Floating Equipment.
- III. - The Development of Permanent Way, Bridges and Signals.
- IV. - Canal Structures.
- V. - Relics from the Eastern and Western Lines.
- VI. - Seals and Charts illustrating the Chronological Development of Corporate Consolidation.
- VII. - Miscellaneous Views, old and contemporary.
- VIII. Illustrations of Typical Industries, located along the Eastern and Western lines.
- IX. - Models illustrating Statistics of traffic, consumption of stores, etc.

cc.

cc.

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X. - Specimens illustrating the operations of the Department of Chemical and Physical Tests.

Installation.

In preparing this exhibit, the methods of installation and labelling which prevail in the United States National Museum, were followed in many respects. The paper by the Assistant Secretary in Charge of the National Museum entitled, "Museum History and Museumsof History" was closely studied, and the principles therein laid down, which the author has thus briefly summarized, were followed, to-wit:

"No pains must be spared in the preservatons of the mater~~i~~-
hial in the exhibition halls. The specimens must be prepared in the
"most careful and artistic manner and arranged attractively in well
"designed cases and behind the clearest of glass. Each object must
"bear a label, giving its name and history so fully that all the
"probable questions of the visitor are answered in advance." #

Size of Models.

In deciding upon the size of the models to be exhibited, the belief that, in a great ~~Exposition~~ containing many buildings widely separated from each other, the visitor, especially interested in the gradual development of implements or machinery, desires to examine many objects bearing on the same subject, in as limited a space as practicable, led to the construction of models generally one-eighth or one-tenth full size. By this means, a person studying the collection, especially in a crowded hall, is able to dis-

cern the difference between several models by changing his position a very few feet. He thus obtains much of the information intended to be conveyed, quickly and with ease, which would be entirely lost if the models of so large an object as a locomotive were full or even half size. Admiration for the skill of the mechanic who is able to make a faithful reproduction in miniature, of a complicated machine, also adds to the interest of such a collection.)

(Close observation of thousands of visitors, who daily inspect the exhibit, leads to the belief that this decision in favor of small models, was fully justified.

Harmonious Coloring Adopted.

9 In designing the cases, frames, mats, labels, and other furnishings, it was decided to confine the colors as far as possible to ~~Two~~ — Mahogany (or terra-cotta), and Cream Color. In carrying out this idea, the walls of the exhibition hall, the floor of which is laid with white marble tiles, are tinted Cream Color. Polished mahogany was selected for the wood-work of the cases, frames, pedestals and blocks; the shelves and the interiors of the cases are painted a cream tint; the picture mats are of this ~~same~~ shade; and the smaller labels are all printed in terra-cotta ink on cream-colored cardboard or paper. Some of the larger labels are painted on thin mahogany boards with cream and gilt letters. These are easily read, especially at night.

In an exhibit installed in a single hall of 4000 feet floor area, this color treatment is satisfactory, especially with a few decorative features added in the way of crimson banners and multi-colored shields. In a large exhibit, containing collections differing in character, and occupying several halls not decorated with bunting, and in which large wall area is available for exhibition purposes, this treatment, would doubtless prove tiresome, unless warmer tints are applied to the case interiors and dados..

Large Wing-Frames used.

The National Museum standard wing-frame, for glass, 22" X 38 inches, was adopted. To this was added a transom for glass, 4 X 28 inches, in which is installed a general label, performing very much the same function as the page heading of a book. This arrangement has proved very useful, especially to those who can only devote a short time to examining the large number of illustrations shown. In order to strengthen the corners of these wing-frames, brass triangular corner-plates are set in the back of the moulding. To these the hinges are cast, so that the screws are entirely hidden from view. The lugs, cast in one piece, are made much heavier than the Museum Standard. These large frames, with almost double the glass area of the National Museum Standard, have withstood very rough handling in the crowded Halls without damage to the frame, hardware, glass or specimens.

Labels.

As this is an international exposition, it was decided to print the labels in five languages, viz.- English, German, French, Italian and Spanish. This made it necessary either to abbreviate some of the longer labels or to set the foreign portion of the labels in type of smaller size than that generally used in Museum practice. The arrangement of the labels required much thought. After several experimental labels had been printed, it was decided that the label heading should appear only in English and the descriptive matter should be printed in the five languages, the English portion being printed in bolder type than the others. The arrangement of one of the shorter labels set in the type used is shown below. ^{Fig 2} (~~Text figure 10~~)

Foreign visitors, who were questioned concerning this method, stated that the labels were intelligible, notwithstanding the fact that they were unfamiliar with the English language.

World's
Other Transportation Exhibits at the Columbian Exposition.

Never in the ~~World's~~ history have so many machines and im-
 plements of ~~transportation~~, land and marine, been assembled, as were
 to be seen in Jackson Park ~~at the close of the fiscal year June~~ *during the summer of*
~~30, 1893.~~ It is a gratifying sign that many of the great ~~trans-~~
 portation ~~companies~~ that send objects to the World's Fair devote
 money and space to an historical exhibit.

Historical Railway Exhibits.

exhibited
 Among the ~~American~~ ^A Railway ~~Companies~~, in addition to the Pen-
 sylvania Railroad ~~Exhibit~~, alluded to above, the most notable
 historical collection is that shown by the Baltimore and Ohio Rail-
 road Company, in which the history of the World's Railway is exem-
 plified by an extensive and valuable series of fifty or more full-
 sized models [†] and original locomotives, and a gallery of over two
 thousand drawings and paintings illustrating the development of the
 locomotive and permanent way during the two centuries since Sir
 Isaac Newton attempted to apply steam to locomotion upon land.

The New York Central Railroad Company which also erected a
 special exhibit building, display a facsimile of the historic train
 drawn by the locomotive "De Witt Clinton" [†] on the Mohawk and Hudson

 † Models on a smaller scale of several of the historical locomotives.
 of the Baltimore and Ohio Railroad Company were presented by
 that Company to the U.S. National Museum in 1889.

† One of the original driving wheels of this locomotive forms a part
 of the ~~Transportation~~ collection in the National Museum.

Railroad in July, 1831. It is interesting to note that these three great American Companies have alone spent an amount approximating a quarter of a million of dollars in making and housing their historical exhibits at the Columbian Exposition.

The most extensive exhibit ever made at an Exposition to illustrate the beginnings and development of permanent way, ^{that is} is the Haarman track Museum of Osnabruck, Germany, located on the south

✓ The book describing this collection contains several illustrations from specimens in the U.S. National Museum and many quotations from the Curator's paper on "The Development of the American Rail and Track (Report of the U.S. National Museum 1889).

side of the Annex to the Transportation Building. This exhibit offers abundant food for study for American Engineers interested in the solution of the gravest problem in Maintenance of Way.

The South Carolina Railway, for which the first American locomotive was built, which, in 1831, owned and operated the first one hundred miles of railway controlled by a single corporation, exhibits an interesting series illustrating the development, ^{during the past} for ~~the~~ ^{sixty} years, in track construction on that historic Railway. It is understood that this collection will be deposited in the National Museum at the close of the Exposition.

The Old Colony Railroad Company exhibits a reproduction of their old time stagebody railway coaches.

The Illinois Central Railroad Company exhibits the famous locomotive "Pioneer", one of the first locomotives that ran ~~West~~ of the Allegheny Mountains, ^{the} first that went into service in the city of Chicago.

The State of Georgia exhibits the war locomotive "General" made famous during the rebellion by the Andrews Raiders, many of whom were captured and suffered death in their effort to destroy the railway bridges near Atlanta, while using this locomotive upon that unsuccessful raid.

From foreign lands, the London and North Western Railway of England bring to the Exposition full-sized models of Trevithick's locomotive of 1804, and Stephenson's "Rocket" of 1829, each standing upon the original track upon which it ran. The contrast between them and Webb's English Compound Locomotive - the "Queen Empress" - is most marked..

Historical Marine Exhibits.

Perhaps the most important exhibit relating to the beginnings of the steam boat is the original twin-screw marine-engine built by John Stevens at Hoboken, New Jersey in 1803-4 (See Plate ^D), and exhibited by the Hoboken Ferry Company. This was without doubt the first steam engine that ever furnished power to drive a marine screw propeller. It is gratifying to note that this engine mounted in a reproduction of the boat built nearly 90 years ago, is through the courtesy of Col. Edwin A. Stevens, a grandson of the great Engineer and Inventor, to be deposited in the section of Transportation and Engineering in the U.S. National Museum, at the close of the Exposition.

Among the other steamship companies and marine constructors who made historical exhibits, the following are to be noted:

(The Harlan and Hollingsworth Company of Wilmington, Delaware, the Providence and Stonington Line of Providence, R. I., and the famous Cunard Line of England. Perhaps the most complete model exhibited, was that of the ill fated English Battle Ship "Victoria", that foundered near Gibraltar, June 9 1893.

Conclusion.

It is said upon good authority that the total value of the Transportation Exhibits will approximate ~~_____~~ ^x Millions of dollars. It is interesting to note in conclusion that the first synoptical exhibit illustrating the development of the art of Transportation ever made at a general exposition was made by this section in the National Museum collections exhibited at Cincinnati in 1888 - only five years ago; it occupied less than a thousand square feet of floor space, and while it illustrated the development of every phase of transportation, beginning with human burden bearing and leading up to the Locomotive and Steamship, ^{it} cost only a few hundred dollars. ^u This has interest rapidly grown in the historical as well as the material side of the art of applying the generated forces to the development of our great transportation systems - on land and water - that made it possible for this, the greatest of expositions, to be held and visited by the thousands, who passing through the "golden door" of the great Transportation Building exclaim with Bacon - "There be three things which make a nation great and prosperous, - a fertile soil, busy work-shops, and easy conveyance for men and goods from place to place".

x This amount will be inserted in proof. Chief of the Dept Mr. W.A. Smith will furnish it if I am about
E.W.