

INTERESTING EXHIBITS AT THE PAN-AMERICAN.

The Gruson Iron Works have erected in the space between the two Ordnance Buildings a full-sized model of the Gruson coast defense turret with two 12-inch guns, and for the first time the construction of such a turret is shown to the general public. Inside of one of the buildings there is also a model of a smaller turret, surrounded by photographs showing turrets in different stages of completion. The full-sized model is intended to show the actual size of the turret, the available space inside the thickness of the armor-plate and the general disposition of the guns, gun-carriage and machinery necessary for rotating the turret, elevating and depressing the guns, moving the ammunition, charging the rifles and checking their recoil. The model is open on one side. A number of the armor-plate sectors are left off so that the public can look into the interior, and outside the cross-section of the armor of the rotating cupola is shown, as well as the fixed, outer belt, the former protecting the guns and their service, the latter protecting the substructure and the machinery below. A model of one of the two 12-inch coast defense rifles is in place on its carriage and reaches through the right-hand embrasure or porthole into the open, while the left-hand embrasure is shown in one-half, presenting its cross-section to view. At the rear of the gun is seen the hoisting apparatus and the rammer. Under the gun is the carriage on its supporting girders, running from side to side of the substructure. The girders and the substructure are meant to be of sheet and angle steel; the whole is carried on live rollers and rotated by a circular rack and pinion moved by a steam engine or capstans, which are not represented in the model. The vertical movement of the guns is effected by hydraulic pistons under the top carriage. The water conduits enter through a swivel arrangement in the basement, where there is also a model of the armor-piercing shell, the powder cartridges and one of the trucks which carry them from the magazine to the hoists. Between the guns in the center of the cupola is an iron ladder reaching up to a stand for the commander, enabling him to take aim through a channel in the roof plate and to direct the rotation of the turret accordingly. The diameter of the rotating cupola is 37 feet 1 inch outside and 27 feet inside. The maximum thickness measured horizontally of the plates is over 60 inches, except between the embrasures, where it increases and reaches more than 7 feet in the middle. The outer diameter of the fixed armor belt is about 52 feet. Covering and surrounding this armor belt is a glacis, meant to be of stone and concrete. The cupola presents a comparatively small target, shaped like a turtle's back. The exhibit does not fail to attract great attention.

The Army and Navy exhibits are among the most interesting, not only of those in the Government Building, but also in the entire exposition. We present two engravings, one of the Cyclorama exhibit by the Navy Department, and the models showing government mules transporting fixed ammunition; the latter does not call for special comment, except to show the completeness with which all the interesting features of the service are presented.

The Cyclorama shows the back of a naval vessel and consists of a full-sized model of the port side of the quarter-deck of a cruiser upon which are grouped officers and men of the navy in the different uniforms worn by them. No attempt at likeness was made except in the case of Admiral Dewey, whose uniform is that known as "special full dress," and consists of a dress-coat with standing collar lined with white silk. The collar has around it gold lace one and three-quarters inch wide, and on the cuffs are three bands of gold lace, two of them two inches wide and one of one inch between them, with a gold star above the upper band. Epaulettes are worn, and the sword-belt has three rims of gold embroidery a quarter inch wide, one on each edge and one in the center. The slings for the sword are embroidered in the same manner, except that the edge, etc., is but an eighth of an inch wide. The trousers have a gold stripe on the outer seam, one and three-quarters inches wide. The sword is of the regulation pattern. The cocked hat is bound with gold lace one and three-quarters inches wide. The captain is in "full dress," which is a frock coat with epaulettes, gold-laced trousers and cocked hat bound with silk braid. The sword-belt has gold lines running through it. There are two commanders of the staff and a lieutenant-commander in "dress" uniform, one lieutenant in service dress and a captain of marines in full dress, gorgeous with embroidery from cuffs to elbow. There are two petty officers and a group of seamen. The rail, wheel, skylight, etc., are all natural, being taken from the deck of a cruiser and sent out to be used in constructing this model. At the extreme right is a turret with projecting guns. The background shows the open sea with cruising vessels in sight and approaching. On the exterior of the circular back of the Cyclorama are photographs, hydrographic charts, etc., and the space immediately about the Cyclorama is given up to models of various

vessels of the old and new navy, one group being those that were at Manila, May 1, 1898, while in another group are the vessels which engaged in battle at Santiago, July 3, 1898. There is also a half model of the 13-inch gun, split longitudinally, a Spanish torpedo from the "Maria Teresa," a 4-inch breech-loading rifle, a 14-pounder, a 6-pounder, a 3-pounder, a 1-pounder, a surgery and sick bay, as well as exhibits of life buoys, marine corps models, powder, model of a drydock, map of the world showing the daily positions of naval vessels, etc.

The miniature railway at the Pan-American Exposition never fails to attract attention. The railway runs through a beautiful section of the grounds, and its piercing little whistle warns the casual visitor not to walk upon the railway ties. Our photograph was taken just in front of one of the Ordnance Buildings while the engineer was sitting upon the tender.

Not by any means the least striking novelty in the transportation exhibit at the Pan-American Exposition is the Vanderbilt locomotive. The locomotive itself is by this time very familiar to the readers of the SCIENTIFIC AMERICAN. The firebox is circular in cross-section and corrugated, and thereby provides a construction which is cheaper, safer, more durable and less liable to the quick deposit of scale. The adoption of the cylindrical form of firebox proved so satisfactory that it was natural for Mr. Vanderbilt to look for some other part of the locomotive on which the cylindrical construction could be adopted to advantage, and the tender naturally received first attention. As will be seen from our photograph, the tank is of cylindrical form, and the coalbox has been shifted to the front end of it and made considerably deeper than the old form of coalbox. As far as the water tank is concerned, this provides a stronger and cheaper construction, and the coal capacity, in proportion to the amount of water carried, is larger than in the old type. Moreover, the coalbox being at the front end of the tender and much deeper than formerly, the fuel tends to find its way to the footplate by its own gravity, and the work of the fireman is proportionately reduced. The patent for the Vanderbilt locomotive has been sold to the Baldwin Locomotive Works, and this type has already been introduced upon many of the leading railroads of the country, including such roads as the Baltimore & Ohio, the Illinois Central, the New York Central, etc.

Automobile News.

A lady was entering the forest of St. Germain near Paris, in a 16 horse power automobile when the machinery became out of order. The passengers brought the car to a standstill in order to overhaul the engines, when almost immediately a violent explosion occurred and the car was enveloped in flames. The passengers had a narrow escape. The liquid fuel in the reservoir of the car overflowed and became ignited, and it was feared that the burning stream of oil would run among the bushes fringing the road, setting them alight, in which event the forest would have been involved and widespread damage caused. The forest fire, however, was averted by the felling of a few trees and the cutting away of the undergrowth in the vicinity of the burning vehicle. The motor car burned fiercely for about an hour, leaving only a mass of tangled steel and ironwork. The value of the automobile was \$5,000.

The Hon. Charles Rolls, one of the foremost automobilists in England, recently delivered a lecture in London concerning the advantages of the motor car over horses. The principal advantages, he explained, were less wear and tear upon the roads, better steering, more room for traffic owing to the small amount of space the motor car occupies, and cheaper transportation. A ton of goods can be transported in England for 40 miles for less than \$1.50. He also anticipated that the more universal utilization of motor vehicles would result in an improvement of the breed of horses, since several horses would be relieved from traction for which they were neither suited nor intended by nature. For military purposes the motor car was vastly superior in the transport department. This fact was shown in the present war in South Africa. There was one machine, plying between Commando Nek and Pretoria, a distance of about 26 miles, which accomplished the work for \$18 that had previous to its introduction cost \$1,200, and also did the same amount of work that 960 trek oxen could perform, and did not require replacing every six weeks as was the case with the animals. The introduction of motors for transport purposes in war would be much more economical, as this instance proves, besides obviating a tremendous amount of awful suffering on the part of dumb animals.

The British War Office has devised a new use for bullets expended upon target practice at rifle ranges. The present market price for spent cupro-nickel bullets is about \$90 per ton, and contracts have been made for the recovery and removal of these used bullets from the various ranges.

Engineering Notes.

Hydraulic pressure is being successfully employed at St. Etienne in the manufacture of steel in molds tapering toward the top by pressing from the bottom instead of from the top of the casting, as by the Whitworth process. This is said to produce a more homogeneous steel and to give better results generally.

During the recent Ashantee campaign the megaphone was tried by the British officers for giving orders, since the columns traversing through the African bush were so long that it was impossible to convey orders in the usual way. The experiment was unsuccessful, however, because the thick jungle and the winding paths prevented the sound from traveling.

Rapid progress is being made upon the new reservoirs at Staines, Middlesex, for the supply of London, and it is anticipated that they will be completed in about two years. The reservoirs are approximately $4\frac{1}{2}$ miles in circumference, and their capacity will be 33,000,000,000 gallons, a sufficient supply to serve the district catered for by the water companies to whom they belong for 100 days. The reservoirs will be supplied from the flood water of the Thames.

The Bureau of Foreign Commerce has received from the Tacoma Chamber of Commerce and Board of Trade the announcement that a new line of steamers has been established to ply between Tacoma and Liverpool, via the Suez Canal, touching at Manila and other Philippine ports, all the Straits ports, and those of India, Arabia, Egypt, the Mediterranean, and the Continent. There are nine ships engaged in this line, with a tonnage varying from 4,000 to 11,000 tons.

A unique twin-screw vessel for the Russian navy, the first of its kind ever built, is in course of construction at Kiel. The ship is described as a "training and transport vessel," and is intended for the practical instruction of naval engineers. It is provided with two four-cylinder triple-expansion engines, and all the various appliances and auxiliary machinery indigenous to a modern man-of-war, so that her crew may obtain a thorough practical knowledge of the mechanism of a battleship. The displacement of the vessel will be 12,000 tons, and she will have accommodation for 20 officers and 700 men. She will cost \$1,375,000 to construct.

Experiments are being made in the signaling department of the English army with acetylene gas for transmitting signals at night. At present ordinary oil lamps and limelight are utilized for this purpose, but the recent tests with acetylene have proved that the latter medium is much more advantageous. A whiter ray of light with increased brilliancy is obtained, and it is far more penetrative than oil or limelight, and signals transmitted by this means can be read at a much greater distance than heretofore. Another advantage in its favor is that the gas can be generated in about one-twentieth of the time required to prepare a limelight, and it is also so portable that one man can easily carry the plant necessary for two lamps.

Consul-General Guenther, of Frankfort, under date of February 27, 1901, reports that a masonry bridge is being constructed across the valley of Petruffe, in Luxemburg, which will have the largest single span of any masonry bridge, viz., 277 feet of a span width and a rising acclivity of 102 feet. Previous to this, the largest masonry bridge span was that of Cabin John Bridge, near Washington, viz., 220 feet, with a rising acclivity of 57½ feet and a height above the water of 101 feet. Following Cabin John Bridge comes the railroad bridge at Jareng, over the Pruth, followed by the Grosvenor Bridge, over the Dee, at Chester. These three spans have been among the world's greatest architectural triumphs in bridge masonry.

Twenty years ago the cities of Albany and Troy were the centers of stove manufacture in America. About that time the competition of some Western points began to be felt. While the stove manufacturers of Albany and Troy appreciated the danger, their skilled employes, banded together in a strong moulders' union, ignored it and argued that the then existing conditions could not be changed. Their locality was nearer the source of the pig iron supply, says Mr. R. W. Hunt, in Cassier's Magazine, and could, therefore, always command cheaper iron; and beyond all, no other points had the same molding sand, and, without that, successful competition against Troy and Albany stoves was impossible. So strike followed strike. In many of these the men carried their points. The conditions governing the employment of apprentices, the hours of labor, and the amount of work produced per man were all satisfactorily controlled; but the development of the natural resources of the great American Northwest was not. To-day the blast furnaces of the Hudson River Valley are a tradition, and the stove foundries of Troy and Albany are diverted to other uses, or else crumbling ruins; while those of Detroit, Aurora, Milwaukee, and other cities farther west are echoing the thud of the rammer, the clank of the molding machine, and the blast of the cupola.

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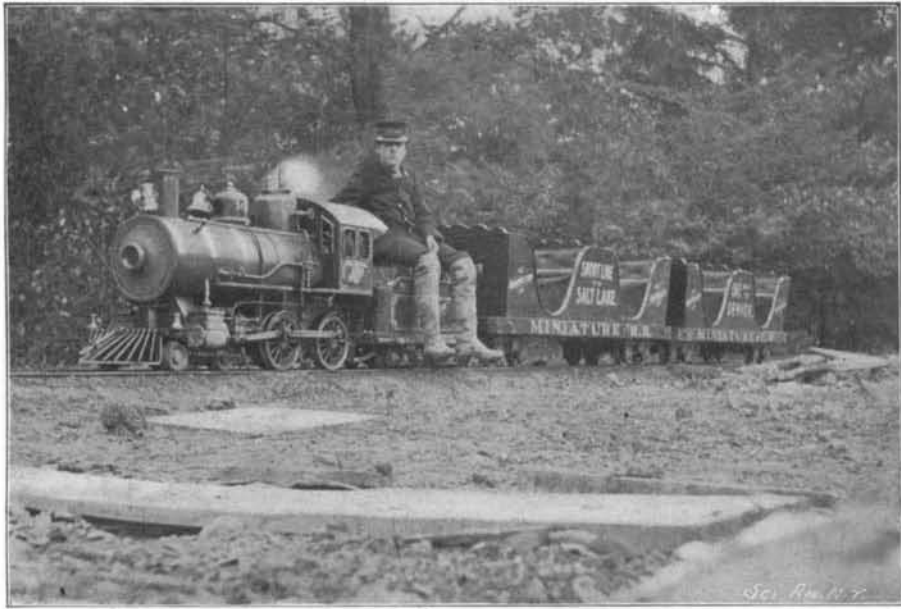
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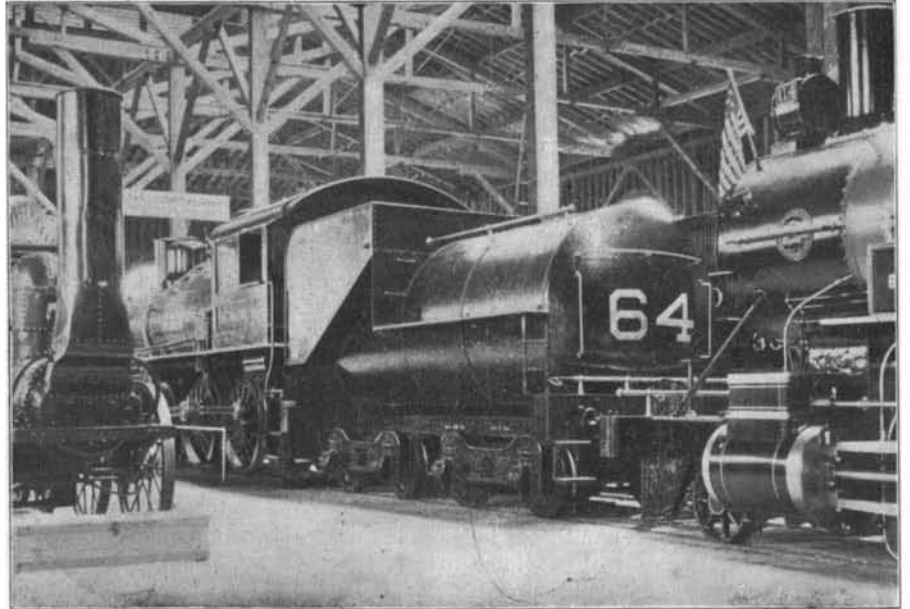
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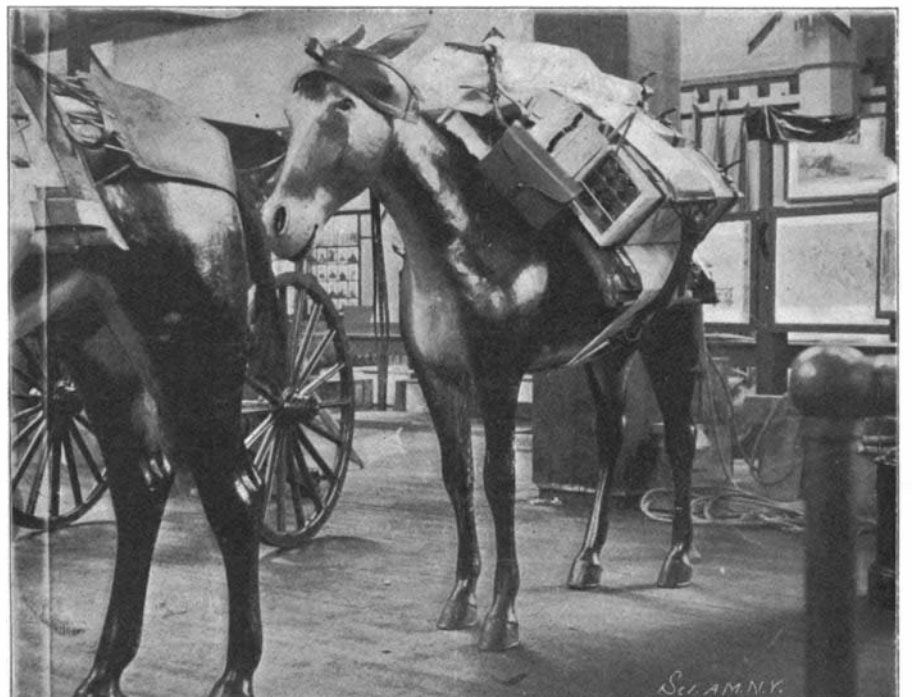
The Miniature Railroad—A Stop in Front of the Ordnance Building.



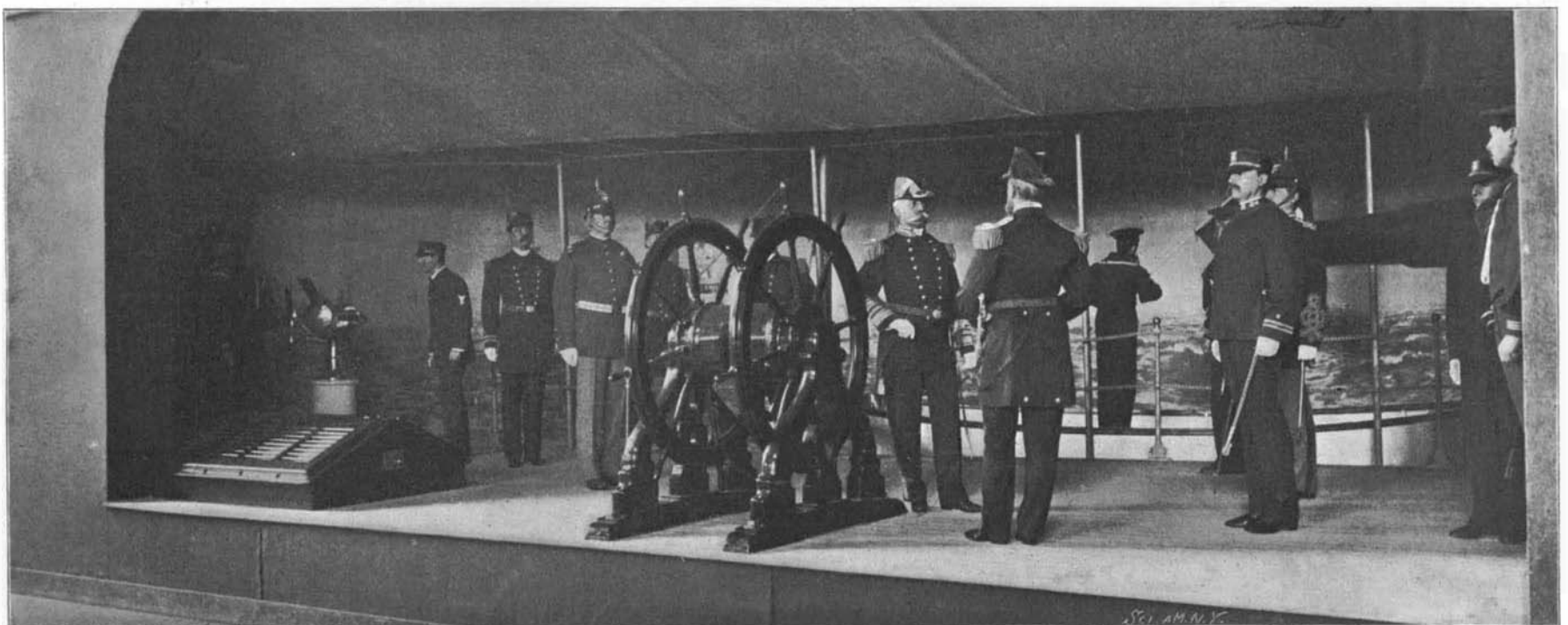
The Vanderbilt Locomotive and Tender.



Model of a Gruson Turret Carrying 12-Inch Guns.



Models of Mountain Artillery Outfits Transported by Mules.



Cyclorama Representing a Portion of a Cruiser with Admiral Dewey and Officers in Full-Dress Uniform.

SOME INTERESTING EXHIBITS AT THE PAN-AMERICAN EXPOSITION.—[See page 23.]