

Plan II. represents part of the palace of the Champ de Mars, which plan we copy from the *Bulletin Officiel* of the exhibition. The shaded upper part represents a portion of the great machine gallery. The galleries numbered 41 will be devoted to exhibits connected with the working of mines; 47, to leather and skins; 45, chemical products; 43, hunting and fishing appliances; 42, forestry appliances; 44, agricultural products, not alimentary; 46, bleaching and coloring; 31, linen; 39, encampment appliances; 38, arms, portable; 35, hosiery and dress accessories; 33, silks; 34, lace and lace making; 36, dresses for the two sexes; 40, toys; 37, jewelry. Returning to the upper portion of plan II., gallery 27 is devoted to heating appliances; 25, bronzes and artistic castings; 26, clocks and other time-keeping instruments; 29, ornamental leather work; 28, perfumery; 22, wall papers; 18, decoration and upholstery; 21, upholstery and tapestry; 17, these three galleries are devoted to furniture; 20, two galleries will contain specimens of ceramic art; 19, crystal and glass work; 24, goldsmiths' work; 23, cutlery; 20, mosaics. The pavilions of various Oriental nations will border this hall of miscellaneous exhibits, on that side of it nearest the Avenue de Suffren. The central portion of the lower part of the plan represents the area allotted to groups III., IV., and V., and to class 60, group VI.

By a ministerial order of August 2, 1887, an international congress of photographers will be held in Paris in connection with the exhibition; and by a resolution dated July 16, 1888, of the minister of commerce and industry, director-general of the exhibition a committee of organization was nominated to make the necessary arrangements. That committee includes the names of some men of great celebrity, including that of M. Edmond Becquerel, the chief pioneer and discoverer in relation to photography in natural colors. No great progress has been made in this research since his experiments of half a generation back. To this day such pictures cannot be fixed, and are slowly destroyed by light. MM. Paul and Prosper Henry, of Paris, who have done such good work in stellar photography, are among the members of the committee, and its president is Dr. Janssen, director of the Astronomical Observatory at Meudon, who discovered in India how to photograph the red flames of the sun without an eclipse. M. Davanne, vice-president of the French Photographic Society, is one of the most active members of the committee. The congress is expected to be held at some period between July 15 and August 15, 1889. We are indebted to the *Engineer* for the foregoing and for the plans herewith given.

U. S. GUNBOAT YORKTOWN.

The gunboat Yorktown is the first of a group of three, all similar in design. She is somewhat smaller than the Swatara class of vessels, but in offensive and defensive power and speed is immeasurably their superior.

She is a twin-screw, coal-protected cruiser, with poop and fore-castle decks, with an open gun deck between.

Forward and aft, throughout the length of the vessel, is a three-eighths inch steel watertight deck, under which are placed the machinery, magazines, and steering gear. The principal dimensions of the ship are as follows:

Length between perpendiculars, 226 ft.; depth of hold, 18 ft. 9 in.; draught forward, 13 ft.; draught aft, 15 ft.; mean draught, 14 ft.; displacement in tons to L. W. L. (loaded water line), 1,703 tons; area, L. W. L., 5,765 sq. ft.; sail area, 6,352 sq. ft.; indicated horse power, natural draught, 2,200; forced draught, 3,300 H. P. Her maximum speed is calculated to be 16 knots, but it is believed she will show even better figures than these. Her crew will consist of 160 men all told.

The Plating (outside).—Garboards, 15 pounds, or about $\frac{3}{8}$ inch; from thence to main deck, except double strakes amidships, 14 pounds; above main deck, 10 pounds. The plating up to the watertight deck is lap jointed and single riveted at the edges. Above the watertight deck, amidships, the plating is flush jointed and single riveted at the edges. All plates are double riveted at the butts. In the wake of the torpedo ports and the machine guns the plating is 40 pounds, or 1 inch thick, as a protection from the fire of an enemy's machine guns.

A conning tower, oval in shape, is built on the fore-castle deck, athwartship, $7\frac{1}{2} \times 4$ ft. fore and aft, 5 ft. $4\frac{1}{2}$ in. above the deck, with a cover with a vertical travel of 3 inches. The tower is fitted with complete steering apparatus, speaking tubes, and telegraphs to the engine room. A handsome wood pilot house is fitted forward of the conning tower, with plate glass windows, steam steering wheel, telegraphs, etc. This pilot house is to be used in time of peace when cruising; but in an action, all manipulation of the ship will be from within the conning tower.

Her rig is that of a three-masted, fore and aft schooner. In coal endurance, the normal supply is 200 tons, but the bunker capacity is for 400 tons. This coal is disposed in the wake of the machinery and boiler, so as to give additional protection to these most invaluable adjuncts of the ship.

ENDURANCE OF THE YORKTOWN.

Speed.	Indicated horse power.	Coal.		Distance per day.	Coal supply of 393 tons.		Coal per H. P. per hour.
		Per hour.	Per day.		Distance can steam.	Days.	
Knots.		Tons.	Tons.	Knots.	Knots.		lb.
16	3,300	2 60	61 7	384	2,419	6 3	1 75
15	2,620	1 75	42 1	380	3,368	9 35	1 50
14	2,000	1 33	32 1	366	4,138	12 31	1 50
13	1,600	1 07	25 8	312	4,773	15 03	1 50
12	1,230	0 48	19 7	288	5,770	20	1 50
10	850	0 34	11 04	240	8,542	35 5	1 80
8	375	0 26	6 24	192	12,062	62 9	1 80
6	200	0 17	4 08	144	13,870	96 3	2

The motive power is furnished by two triple-expansion engines, placed in separate watertight compartments, and develop with natural draught to 2,200 H. P., and forced draught to 3,300 H. P. The cylinders are 22, 31, and 50 in. in diameter, with 30 in. stroke. The pumps of all kinds will be driven by auxiliary engines. The two propellers are each three-bladed, and are $10\frac{1}{2}$ feet each in diameter. There are four boilers, and are of the cylindrical horizontal pattern; each 9 ft. 6 in. diameter and 17 ft. 6 in. long; with a grate surface of 220 square feet.

There are two sets of dynamos to furnish a system of incandescent electric lighting throughout the ship. The search lights are of 25,000 candle power.

Armament.—The main battery is composed of six 6 in. breech-loading rifles, two on the fore-castle and two on the poop, with the line of fire about 18 feet above the water. One is mounted on each side in the waist of a sponson, at a height of 10 feet from the water. The forward guns concentrate at 300 feet forward the stem, and the after two at 300 feet abaft the vessel, while three guns on one side can be concentrated at a point 100 feet from the side of the vessel. The secondary battery consists of eight rapid-fire guns and revolving cannon on the rail and tripod mounts. The Yorktown has eight torpedo guns or launching tubes, fixed ones, in the stem and stern, and three training tubes on each side. Automobile torpedoes will be fired from these tubes, and there is a complete outfit of boat, spar torpedo, gear, and charges.

The quarters for the officers are under the poop deck at the stern of the vessel, and are admirably lighted and ventilated. The crew's quarters are situated on the forward part of the berth deck, and are divided athwartship by steel watertight bulkheads, fitted with the necessary watertight communicating door. The dispensary and mess lockers are also located here. Great space and accommodation are also provided for the crew under the fore-castle deck. The water closets for both officers and men are here located, as are the crew's wash rooms and galley inclosure.

Two 47 mm. Hotchkiss guns are located here, in the bow, and a large space left for the manipulation of torpedoes on each side.

The Yorktown was built at the yards of the Wm. Cramp & Sons' ship and engine building works, Philadelphia, Pa., and is now waiting for the government to give her the official trial before she can be accepted. This trial will probably be made within a few days, and it is anticipated that she will come up to the required standard, and will be put in commission at an early date. With the threatened complications in the Samoa affair, this addition to the new navy will be gladly welcomed.

Improved Polariscopes.

Some improved polarizing apparatus for microscopes were exhibited and described by Dr. S. P. Thompson, at a recent meeting of the Physical Society, London. For polarizer, he uses a special prism, and for analyzer a flat-ended one of his own design. The former prism is formed from a rectangular block of spar, two faces of which are perpendicular to the optic axis; two cuts parallel to the axis are made from the middle of one side to the ends of the opposite, and the cut faces are polished and cemented by Canada balsam. A short prism with wide angle is thus obtained which can be readily fitted to the substage of the microscope. The analyzer, which consists of two wedges of spar, is mounted in a tube which fits on the eyepiece, and by recognizing that the upper end need not be larger than the pupil of the eye, the author has been able to considerably reduce the length of the prism, and still keep the bottom end large enough to collect all the rays passing through the eyepiece.

Several ingenious methods of cutting spar so as to produce prisms with minimum waste were described and illustrated by models, and a "Nicol" made by the inventor at the age of seventy-nine was exhibited.

Mr. Lant Carpenter asked the author why he condemned analyzers placed directly behind the objective; for in his experience this arrangement gave the most satisfactory results.

In reply, Dr. Thompson said his experience was decidedly different from that of Mr. Lant Carpenter, and mentioned that Zeiss had abandoned the common arrangement and now introduced his analyzers between the two lenses of his Huyghenian eyepieces.

Correspondence.

Query 22 of December 15, 1888.

To the Editor of the *Scientific American*:

Is there not another error in answer 22 of your issue of December 15, 1888?

T. B. A., in your issue of January 12, points out an error, which you state is typographical. This is evident by the solution of the equation $(500 - x) + 0.08x = 200$; but I contend that the value of x , \$326.09, in this equation, and not \$340, as you state, is the answer.

As I understand the problem, the amount due—\$500—was to be a cash payment at the time this transaction took place between A and B, but A being unable to meet his obligation, B agrees to extend the time for the payment of a balance, provided A will pay him part of the principal, and the interest in advance on the unpaid part.

Now, by these terms, I cannot understand how interest can be charged on the cash payment—\$500— x —and therefore the amount due B at the end of twelve months is simply the unpaid balance, \$326.09.

"WALDO."

Roxbury, Pa.

[There is much probability in your statement. The only value attaching to the problem is as a question of algebra. Its wording is such that it is not easy to definitely solve it.—ED.]

Whence the Corona?

To the Editor of the *Scientific American*:

The solar eclipse of New Year's day has again brought up the question of the nature of the corona. Of the attempted explanations of this phenomenon, the one ascribing it to a diffraction of the sun's light on the edge of the moon seems to have found most favor, though it is not very clear how light thus diffracted can become visible as a halo without falling upon gaseous matter around the moon.

When the igneous mass out of which our satellite evolved was cast off from that of the earth to seek its own orbit, it is hardly to be supposed that it went without its due portion of those elements which, so far as they remained in a gaseous state, would eventually form an atmosphere. But astronomers say there is no evidence of a lunar atmosphere.

Many years ago the German philosopher Schopenhauer argued, from primary premises, that the moon once contained water like the earth and, since it lost its own heat, became covered with a crust of ice, which he thought accounted for the brilliancy of its reflected light. Recent speculations on the moon's constitution have led to the same rational view, so that our satellite may be said to be getting credited at least with the possession of crystallized water.

Now, the congelment of the moon's water implies the disappearance of aqueous vapors, and an atmosphere deprived of such vapors might be expected to escape detection by telescopic search, because the remaining gases, nitrogen and oxygen, would be invisible. But it may be reasonably presumed that these gases would sufficiently reflect the sun's light to be rendered luminous under the favorable conditions of an occultation, and hence likely the corona—revealing a lunar atmosphere.

A. PARTZ.

West Philadelphia, January 16, 1889.

A Providential Escape.

A miraculous escape is recorded as having taken place at the Wright Steam Engine Works, at Newburg, N. Y., a few days ago. A pulley weighing nearly eleven tons was being adjusted in a lathe, when suddenly the chain by which it was suspended parted, allowing the wheel to fall into the pit below, a distance of eight feet, where it was broken into eight pieces. At the time the chain parted, one of the turners was standing on the hub of the wheel and was precipitated into the pit below. Those who witnessed the accident rushed to the spot, expecting to find him crushed beneath this enormous mass of iron, but he was discovered alive and sound, although the pit was only five feet wide. Of course the shock was severe, but he was entirely uninjured, save for a few scratches received from flying fragments. With a little help he was able to climb out of the pit, when he was warmly received and congratulated by his friends and co-workers.

The Book Camera.

Kruegener's book camera is a veritable detective. One might be meekly walking along the road, or mixing with the devout going to or coming from church (on a week day, of course), with this innocent-looking, yet really formidable, apparatus in his hand or under his arm, and no one would suspect its nature, for to a casual observer it is a book and nothing more. Yet does it really contain, stored away in its interior, no fewer than two dozen small plates, $1\frac{1}{2}$ inches square, each of which can be brought in rotation to the focusing plane, exposed, deposited into a separate receptacle, and another plate made to take its place, and all this by the simple act of pulling out a small handle, pushing it in again, and pulling a string.—*Br. Jour. Photo.*

SCIENTIFIC AMERICAN

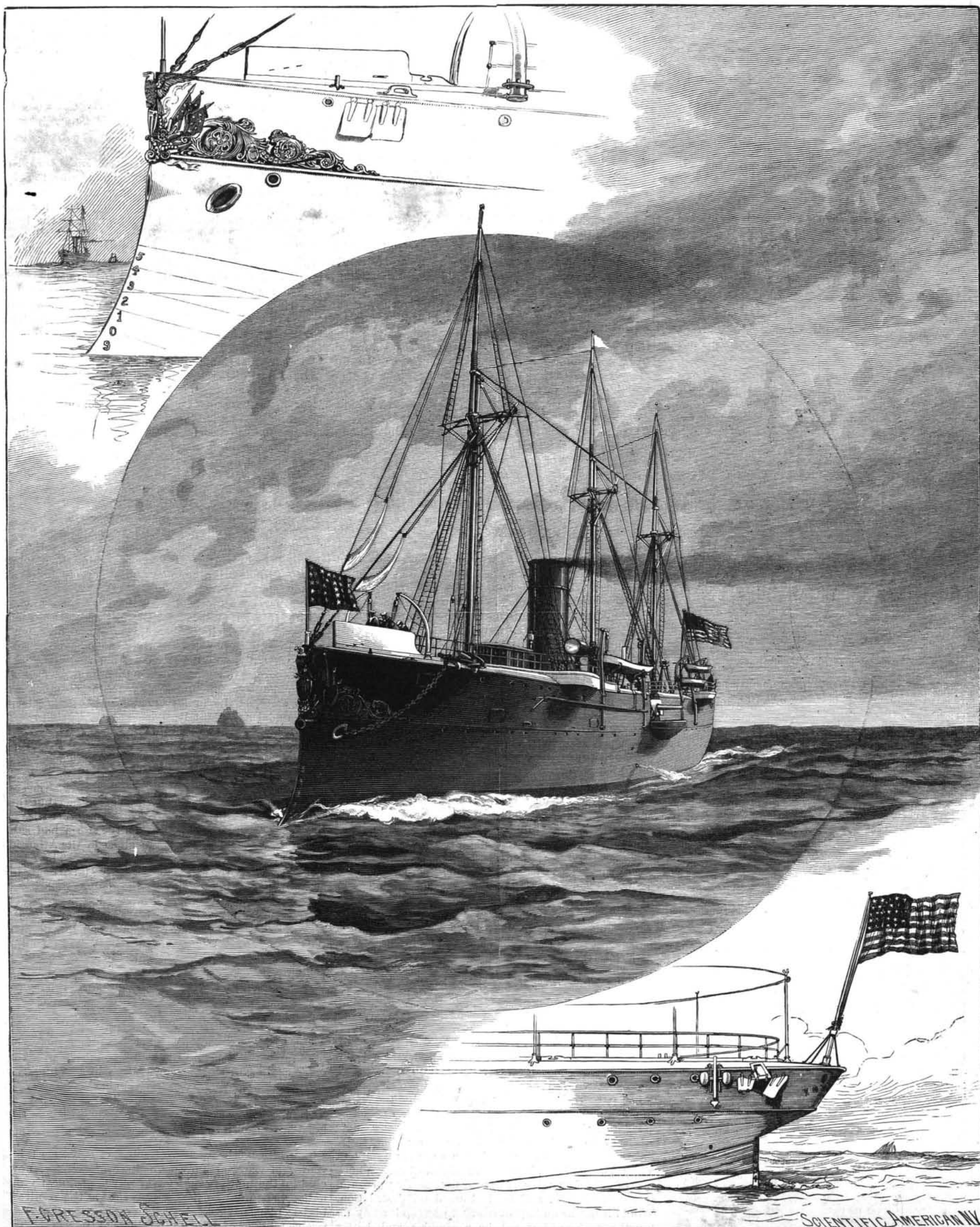
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THE LAST ADDITION TO THE NEW NAVY—THE U. S. GUNBOAT YORKTOWN,—[See page 69.]