SCIENCE

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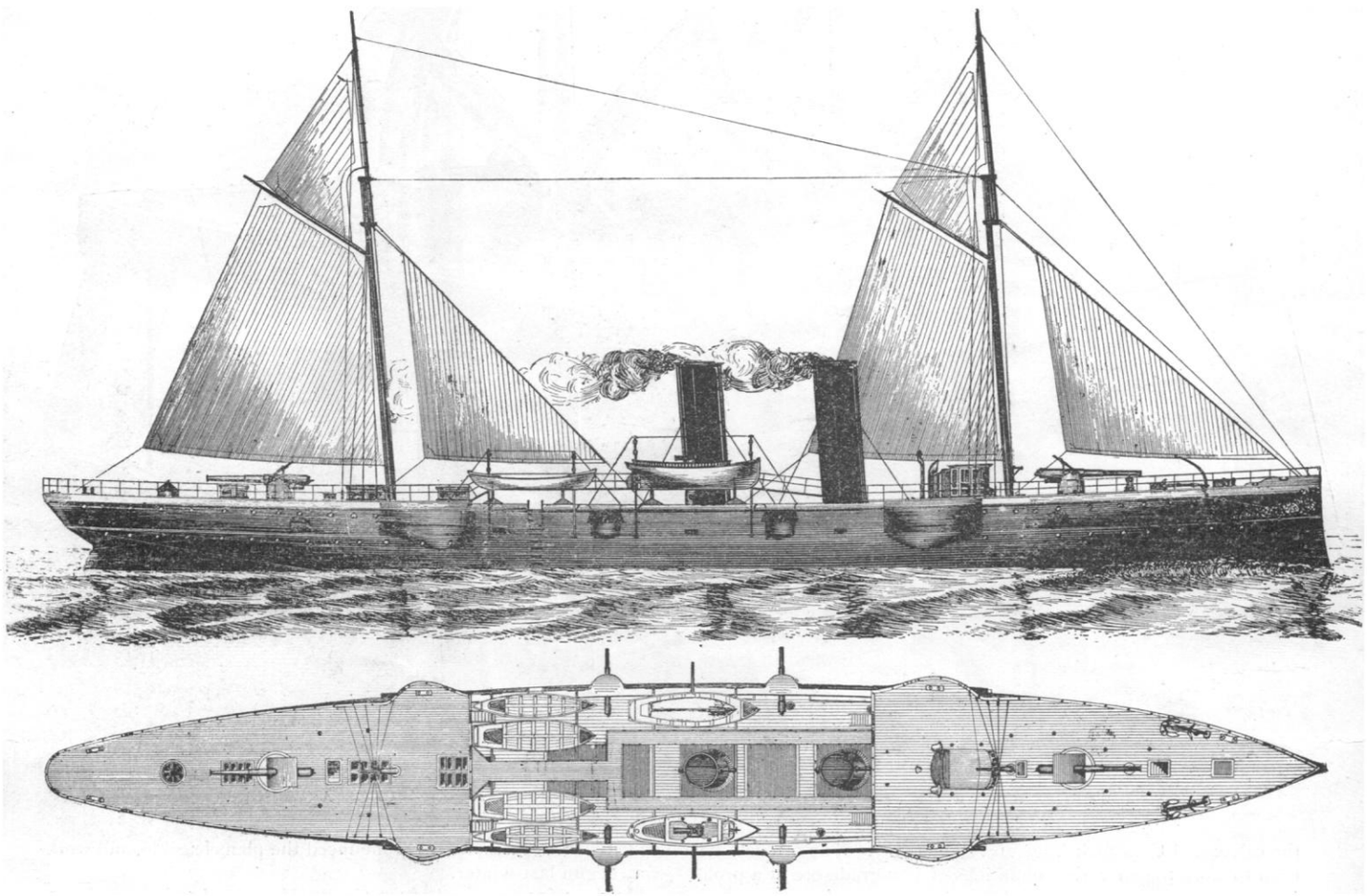
THE NEW TWO-THOUSAND-TON CRUISERS.

THE new 2,000-ton cruisers authorized by an act of Congress approved in September, 1888, are improvements on the Yorktown and Concord class of vessels, being somewhat larger, and intended to make higher speed. They are twin-screw protected cruisers, having, in addition to coal protection to the machinery, a curved steel deck covering the magazines and stearing-gear, besides the engines and boilers, and also a coffer-dam protection extending throughout the entire machinery space. The interior arrangements of quarters are thought to be better than those aboard any of the other vessels, and present many innovations that will without doubt meet the hearty approval of those detailed to occupy them. The ventilation and lighting of all below-deck quarters, storerooms, passages, and so forth, are of the latest approved designs, and will conduce greatly to the health, comfort, and contentment of officers and crew.

These vessels, in their batteries, show how the modern idea of a ship's armament has changed, even in the short time that has elapsed since the United States began the rehabilitation of the navy. Guns of heavy calibers and few in number have gradually given place to those lighter in weight but greater in number, and capable of firing in a given time a much greater weight of projectiles. The main batteries of these vessels, which are the first to carry rapid-fire guns in the primary battery, will be made up of two six-inch and eight four-inch rapid-fire guns; the secondary batteries being two six-pounders, two three-pounders, two revolving cannon, and one Gatling gun. The motive power for the twin screws is furnished by two triple-expansion engines of 5,400 horse-power. The boilers are of steel, five in number, of the return fire tubular type, designed for a pressure of 160 pounds. Three of these boilers are double-ended; and the others, to be used as auxiliaries, are single-ended. The engines and boilers are in separate water-tight compartments. There will be independent air and circulating



NEW 2000-TON CRUISERS.

pumps, and auxiliary condensers, and pumps for the auxiliary machinery. The torpedo outfit for auto-mobile torpedoes, probably of the Howell type, will consist of six launching-tubes, — one forward, another aft, and two on each broadside, — and in addition there will be the usual outfit of boat torpedoes. The rig is that of a two-masted schooner of small sail area, steam being the motive power on which the main dependence will be placed. The cost of these cruisers will be $700,000 each. The bids for them will be opened in August next.

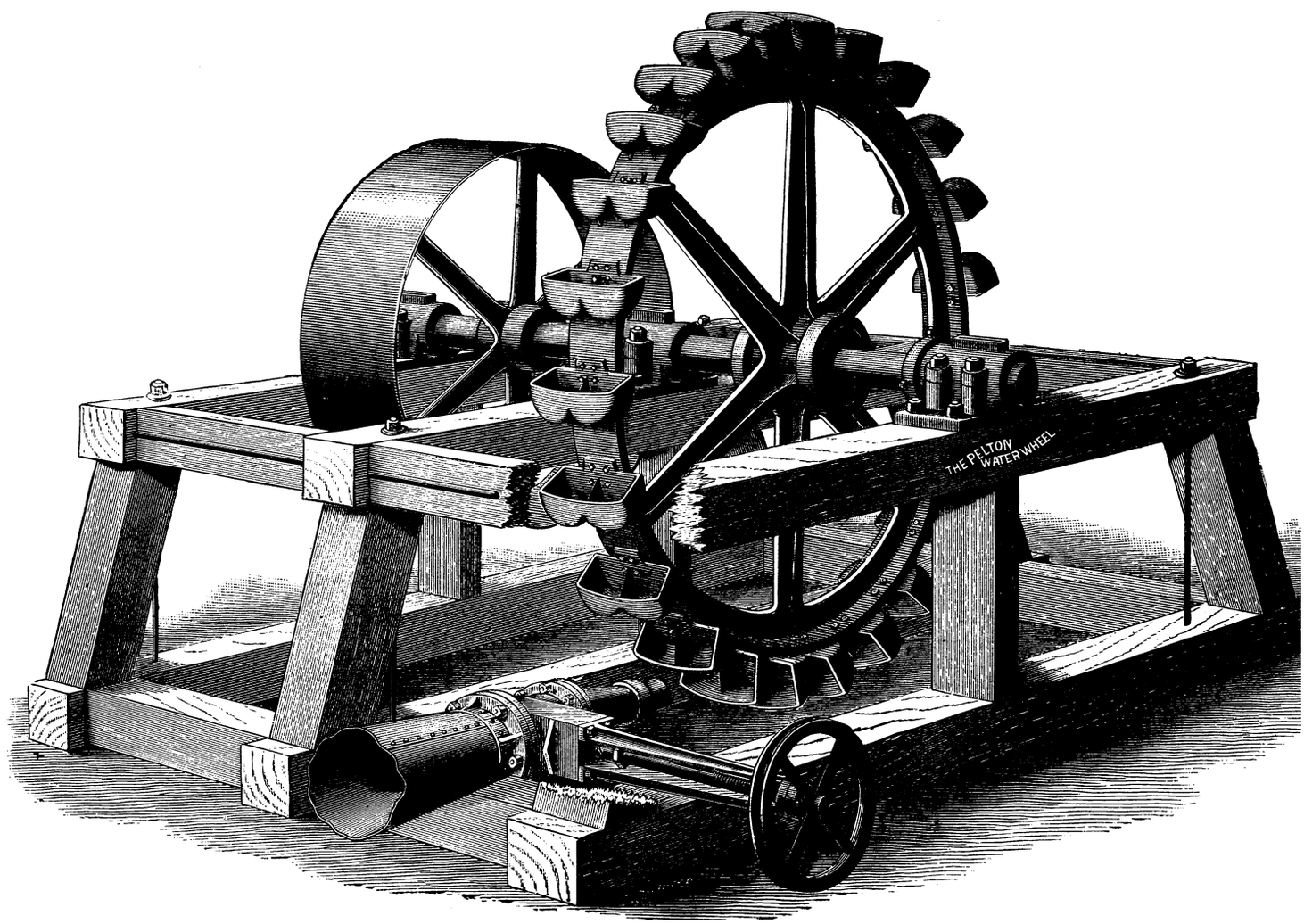
ELECTRICAL POWER TRANSMISSION AT VIRGINIA CITY, NEV.

"MORE power, economical power," has now for several years been the imperative demand of the owners of mining properties on the celebrated Comstock Lode at Virginia City. The problem has been to work the enormous quantities of low-grade ore at a profit. Large sums have been expended in carrying water from streams in the neighboring Sierra Nevada Mountains for a distance of some thirty miles, to be utilized at the mines and mills on the Comstock. But this supply of water is limited and variable, and by no means meets the demand. Operations have frequently been suspended on this account, causing great loss to the mine-owners, and hardship to the laborers dependent upon the active working of the ores.

The best engineering talent of the country has been called to work on this vital problem of power-supply, and new arrangements have been made for increasing the amount of water; but vast powers now within reasonable range are still running to waste, which the use of electricity alone can conserve.

At the stamp-mill of the Nevada Mill and Mining Company, water-power was obtained at the level of the mill from a reservoir on the side of the mountain. The mill contains 60 stamps, with their complement of pans, settlers, agitators, rock-breakers, etc. The water-power readily available was entirely inadequate for the operation of the mill.

The problem was submitted to the Brush Electric Company through its agents, the California Electric Light Company of San Francisco. A solution was speedily offered, and the plans were accepted by the owners of the Nevada Mill and Chollar Mine. The shaft of the latter is close to the stamp-mill. It was proposed to collect the waste water from the surface wheel at the mill, convey it in pipes to the shaft of the Chollar Mine, and thence down the shaft until a sufficient head should be obtained to produce the power required. The scheme was novel, and presented many difficulties. However, experts pronounced the plans feasible, and work was begun last winter.



THE PELTON WATER-WHEEL USED UNDER 1680 FEET HEAD IN THE CHOLLAR MINE.

At the 1,650-foot level of the Chollar Mine a subterranean chamber was excavated out of solid porphyry for the reception of the dynamo electric generators and water-wheels. This chamber is 50 feet in length by 25 feet in width, and 12 feet in height, clear of all timbers. From the tank containing the waste surface water, two wrought-iron pipes are led to the subterranean chamber, one 10 and one 8 inches in diameter. At the bottom of the shaft a Y unites these two pipes into a single one 14 inches in diameter, out of which six 6-inch pipes run to the nozzles of the water-wheels provided to drive the large Brush dynamo electric generator.

The underground electrical station is of the most interesting character, and is shown in our illustrations. The large Brush pri-