SCIENTIFIC AMERICAN

[Entered at the Post Office of New York, N. Y., as Second Class matter. Copyrighted, 1892, by Munn & Co.

A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY, AND MANUFACTURES.

Vol. LXVI.—No. 17. ESTABLISHED 1845. NEW YORK, APRIL 23, 1892. $3.00 A YEAR. WEEKLY.

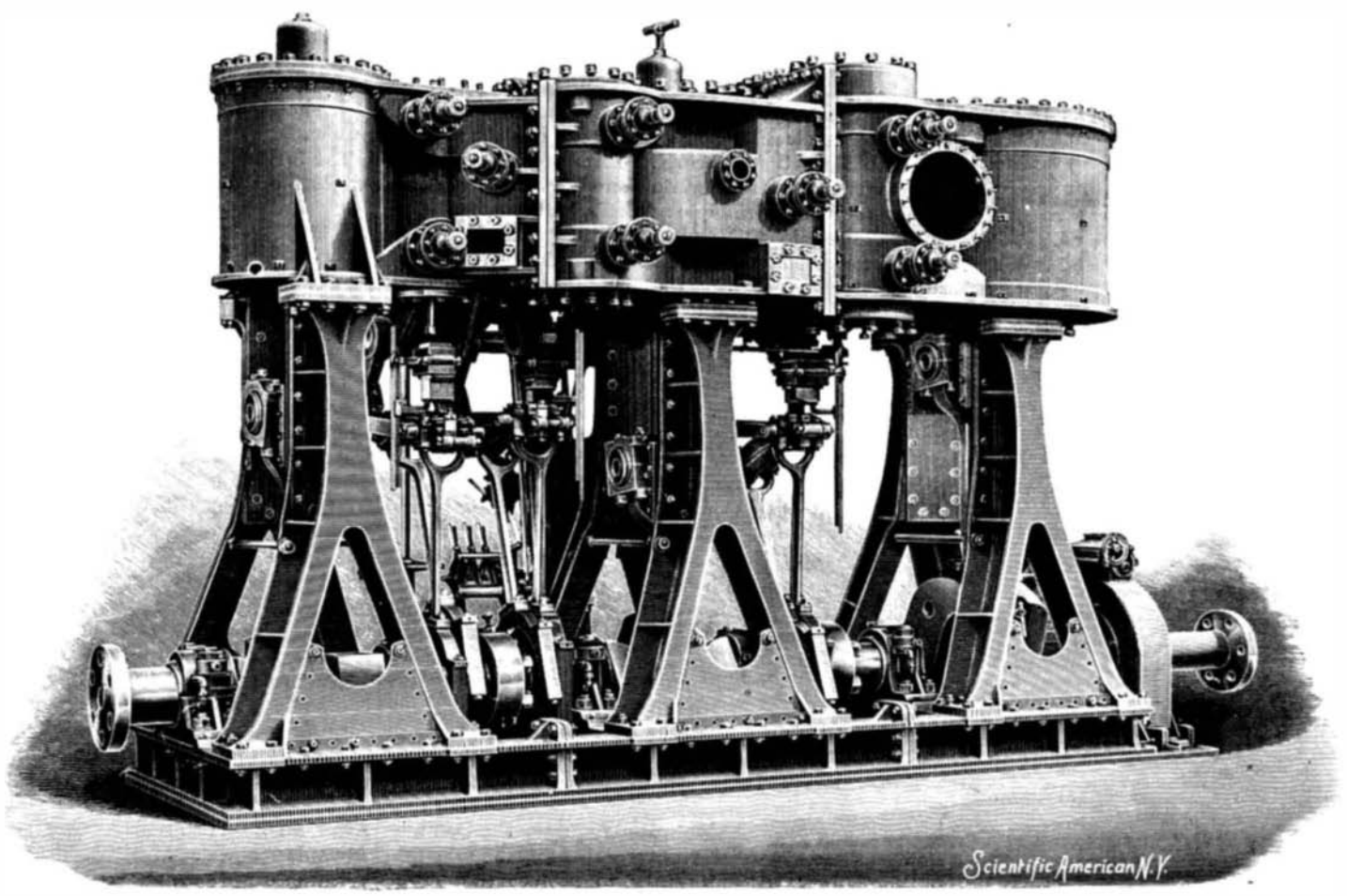
ENGINES OF THE MONTEREY.

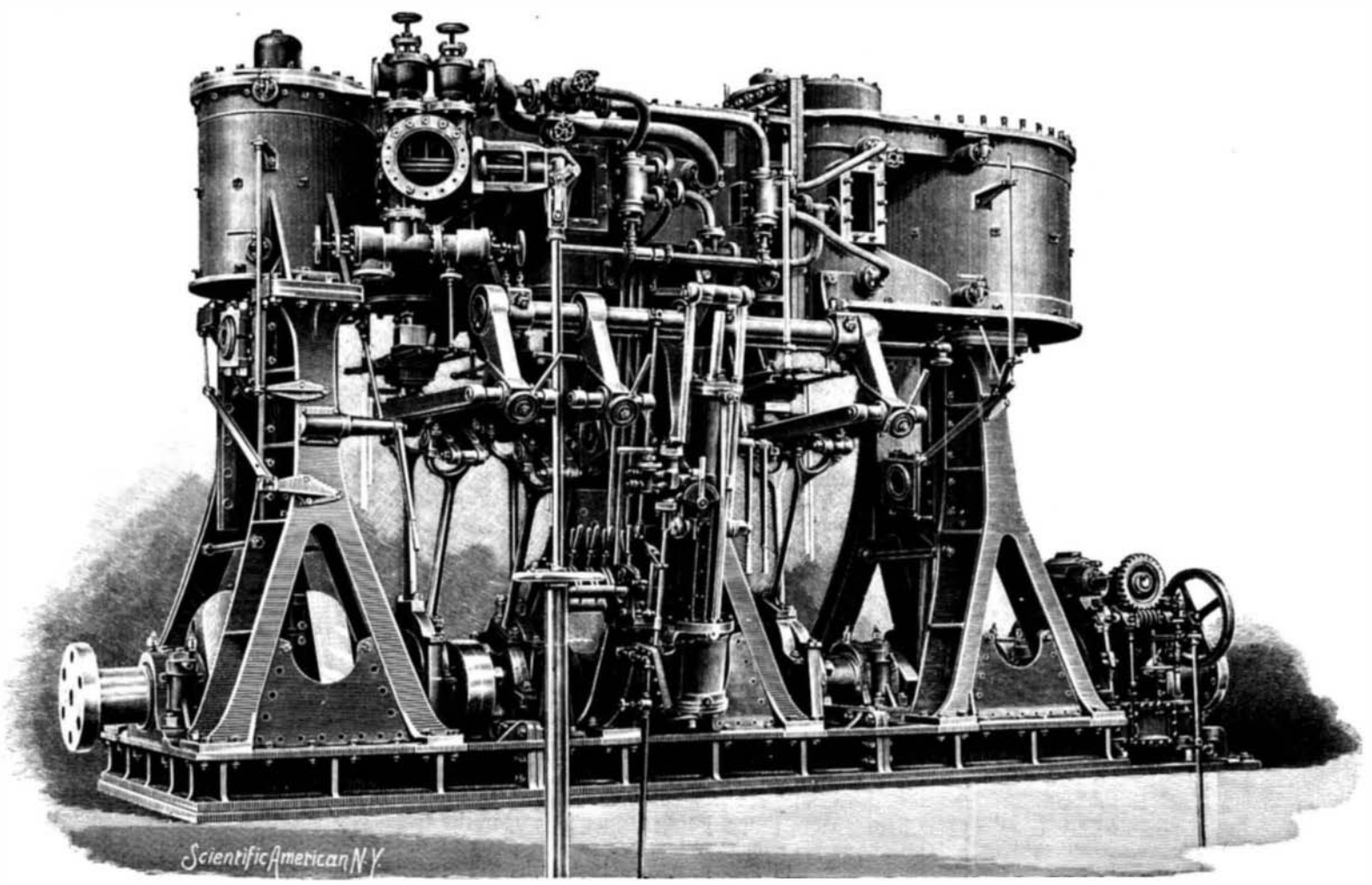
The pair of twin-screw vertical triple-expansion engines shown in the illustration were designed for the United States armored coast defense vessel Monterey, now approaching completion at the Union Iron Works, San Francisco. The first armor plate of the water line belt was put in place on the vessel only a few days ago, it being of American manufacture, of a grade of nickel steel which has withstood the severest tests, and the great twelve and ten inch guns which form the principal portion of her armament are all substantially finished, so that this splendid vessel will soon be practically ready for service.*

The engines will have 5,400 indicated horse power, with 150 revolutions per minute and a steam pressure of 160 pounds. The cylinders are 27, 41, and 64 inches diameter, respectively, and 30 inches stroke. The high pressure cylinder is forward in each engine, and has one piston valve 14 inches in diameter, the intermediate pressure cylinder having two of 14 inches and the low pressure cylinder two of 20 inches, all worked by Stephenson double-bar links. The cylinders are supported by cast steel inverted Y frames secured to cast steel bed plates. The crank shaft is of forged steel, in three interchangeable sections, with 4 inch axial holes through shafts and crank pins. The journals and crank pins are 11 inches diameter. The line, thrust, and propeller shafts are 10 inches in diameter with a 4 inch axial hole. The screw propellers, of manganese or aluminum bronze, are three-bladed, and are 10 feet

(Continued on page 263.)

* For illustrated description of the Monterey see SCIENTIFIC AMERICAN of December 19, 1891.





TRIPLE EXPANSION ENGINES OF THE NEW UNITED STATES ARMORED COAST DEFENSE VESSEL MONTEREY.

© 1892 SCIENTIFIC AMERICAN, INC.

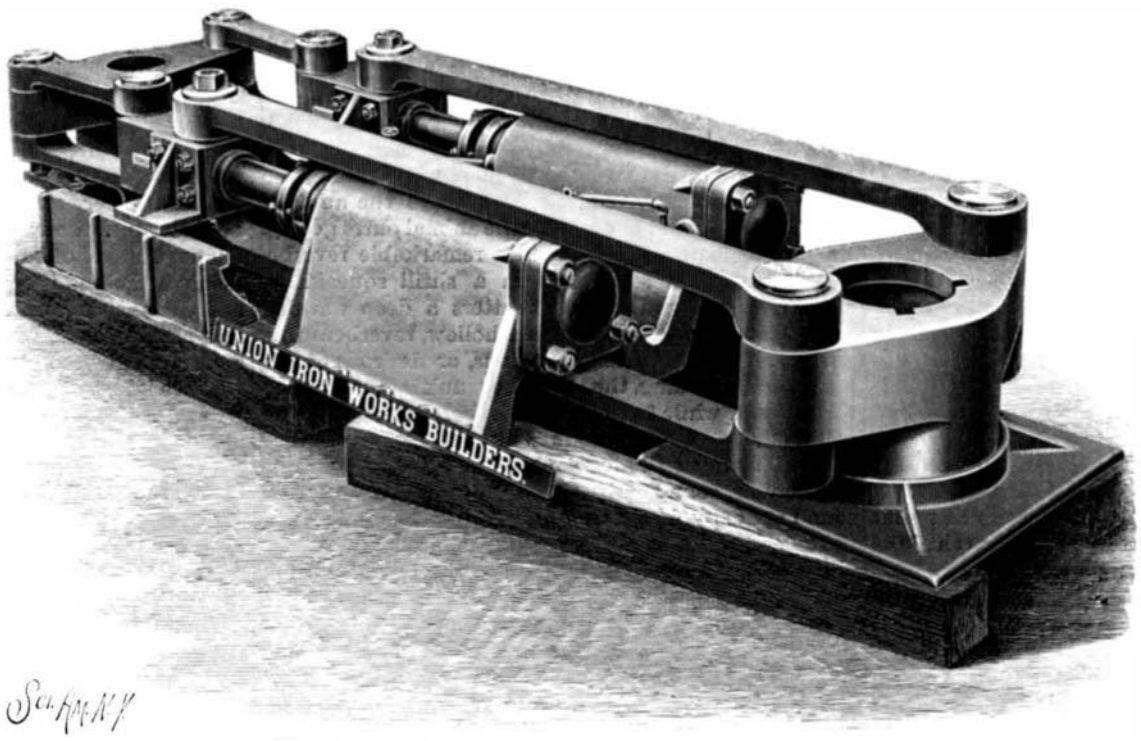
ENGINES OF THE MONTEREY.

(*Continued from first page.*)

6 inches diameter, the starboard one being right and the port left handed.

The condensers are cylindrical, of composition, and have about 3,850 sq. ft. of cooling surface in each. The circulating pumps are centrifugal, with a capacity of 5,000 gallons per minute each, and connections for working as wrecking pumps. Each condenser has two vertical single-acting air pumps, 14⅜ inches diameter by 15 inches stroke, driven by a compound engine with a fly wheel at each end of shaft. There is a valve in the exhaust pipe from each low pressure cylinder, to shut off the connection to the condenser and permit it to be used as an auxiliary condenser when the main engines are stopped. The engines are fitted with starting valves, a steam-actuated throttle, and a combined steam and hydraulic reversing gear, so that they can be handled with ease, and there are the usual auxiliary engines.

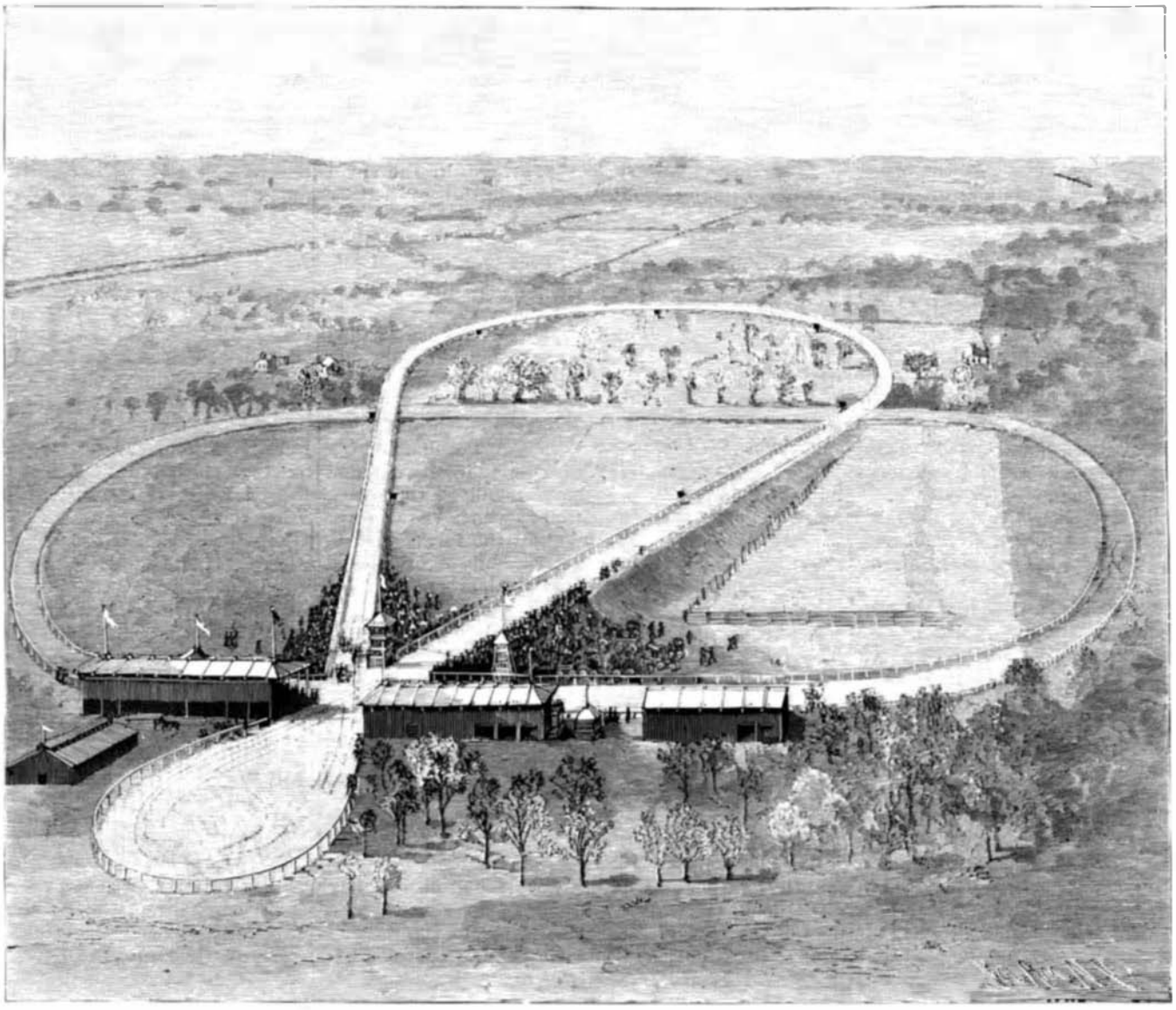
In order to reduce the weight of the machinery to the lowest limit the engines have been made as light as possible, and about three-fourths of the required boiler power is supplied by coil or tubulous boilers. Four boilers of the latter class, to give a collective horse power of 4,500, were contracted for with Charles Ward, of Charleston, West Va., after careful trials. The two cylindrical boilers with which the vessel is also to be supplied are fitted to work at 160 pounds, and are designed to give sufficient steam for ordinary uses, for propelling the vessel at ten knots speed, while the coil boilers enable steam to be raised in less than half an hour in sufficient quantity to give seventeen knots. The total weight of the boilers is reduced about one-half by this combination of the two systems.



STEERING GEAR OF THE MONTEREY.

THE STOCKTON, CALIFORNIA, RACE TRACK.

Our illustration presents an effective comparison of the kite-shaped and the ordinary oval race track. Each track is a mile long, the start and finish on the kite-shaped track being just before the crossing of the tracks toward the small loop, the mile covered by the large loop being divided into eighths. The kite-shaped track at Stockton was opened last year, and some of the world's best trotting records were made thereon during the season. Sunol made the world's record of a mile in 2:08¼; Palo Alto made the world's stallion record of a mile in 2:08¾; Arion made the world's record for two-year-olds of 2:10¾, and Frou Frou for yearling champions of 2:25¾. The kite-shaped track is conceded by horsemen generally to be 2 to 3 seconds faster than the oval track, the straightaway dash at the start being a third of a mile, and there being also one-third of a mile of straight track to the finish. The view of the race from the grand stand is not as good, however, the relative positions of the horses not being so well defined and their action not so readily distinguishable, as they are, for so large a portion of the race, going almost directly away from or coming almost directly toward the observer.



THE KITE-SHAPED RACE TRACK. STOCKTON, CALIFORNIA.

Dangers of Arsenical Soap.

As several cases (one fatal) of poisoning by arsenical soap have come to my notice, I think a few words on its dangerous properties might not be amiss.

The common white arsenic of commerce (oxide of arsenic) when mixed with some animal matter, as the fat in soap, fat skins, or any other albuminoid substance, forms one of the most, if not the most, dangerous poisons known, the ptomaine of arsenic, as follows: All flesh and fats after a short exposure to air begin to decay. One of the products of decay is a cadaveric alkaloid, called a ptomaine; the decay sufficient to form ptomaine might not be noticeable.

Now when you make arsenical soap you probably take some cheap soap that has been made out of half putrid fat, mix your arsenic with it and cork it up. Now this corking up seems to favor the formation of the ptomaine, or keep it from evaporating, as it has always been noticed that matter that has been exposed to the air and then closed up contains more ptomaine than those just exposed to the air. This ptomaine as soon as it forms unites with the arsenic and forms ptomaine of arsenic.

The poisonous qualities of arsenic and the ptomaine of arsenic might be compared to 1 and 100, besides which the following must be considered: That there is no antidote for the ptomaine, while peroxide of iron, or iron rust, is one for arsenic; that it is volatile and can be inhaled, while arsenic is not; that it can be absorbed through the pores, while the little arsenic it would be possible to absorb would act only as a tonic, while the ptomaine acts only as a virulent septic poison in all cases; that the lye in the soap favors the entrance of the poison by softening and more or less removing the epidermis of the skin.

Many taxidermists have remarked the effects of arsenical soap. I find the following by Maynard:

"It is a fact to which I can bear painful testimony that they are, especially when applied to greasy skins, poisonous to the extreme. I have been so badly poisoned when working on the skins of some fat water birds that had been prepared with arsenical soap as to be seriously ill."—*The Oologist.*

Multum in Parvo.

The electric railway plant at Ottumwa, Iowa, contains some distinct and quite novel features. The plant not only generates the power for the operation of the electric cars, but also supplies electric light for the city and furnishes steam heat to those desiring it, the exhaust steam from two 150 horse power engines supplying most of the steam used for that purpose. The steam is carried in mains of 10, 8, 6, 5 and 4 inches in diameter, according to the number of customers probable on the line. These pipes are wrapped with asbestos boards and incased in pine logs bored out, leaving an air space surrounding the pipe; the logs being tapered at the ends and driven solidly into each other. These mains aggregate about 2¼ miles in length and are placed about 5 ft. below the surface.

The system requires an initial pressure of 16 pounds, which produces a pressure of from 8 to 9 pounds at the extreme limit. This of course throws a back pressure on the engines, but as they are of ample power to do all the work required of them, no difficulty is experienced from this cause. In weather in which the exhaust steam does not supply sufficient heat live steam is automatically turned into the mains and retained at the proper pressure. The *Railway Review* says this is the third year that this plant has been in operation and it has proved very satisfactory to all parties connected with it.

© 1892 SCIENTIFIC AMERICAN, INC.