

# SCIENTIFIC AMERICAN

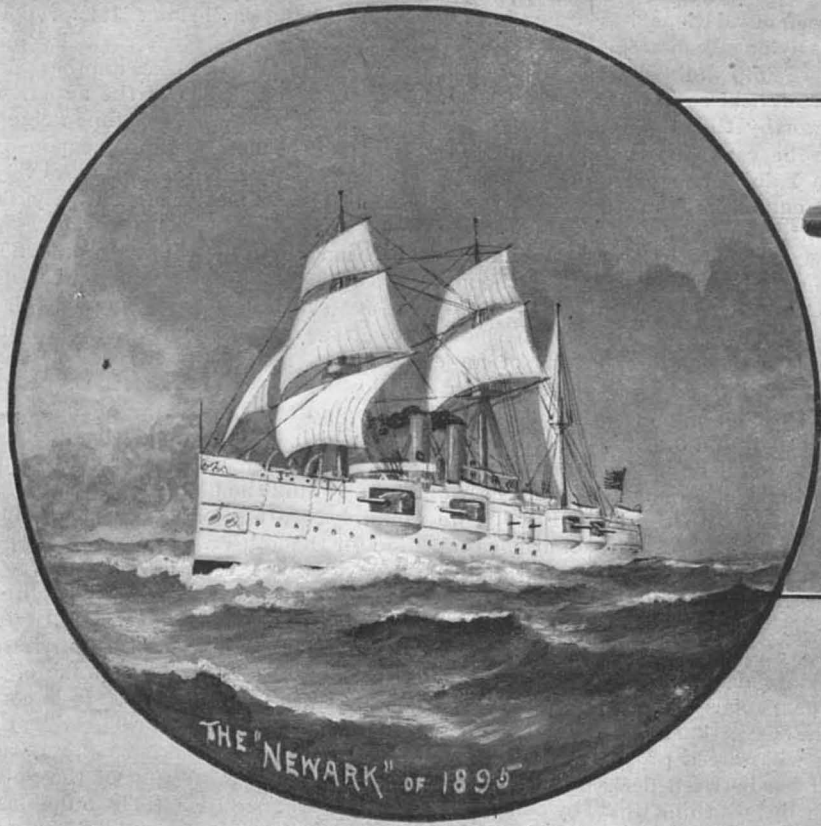
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A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS CHEMISTRY, AND MANUFACTURES.

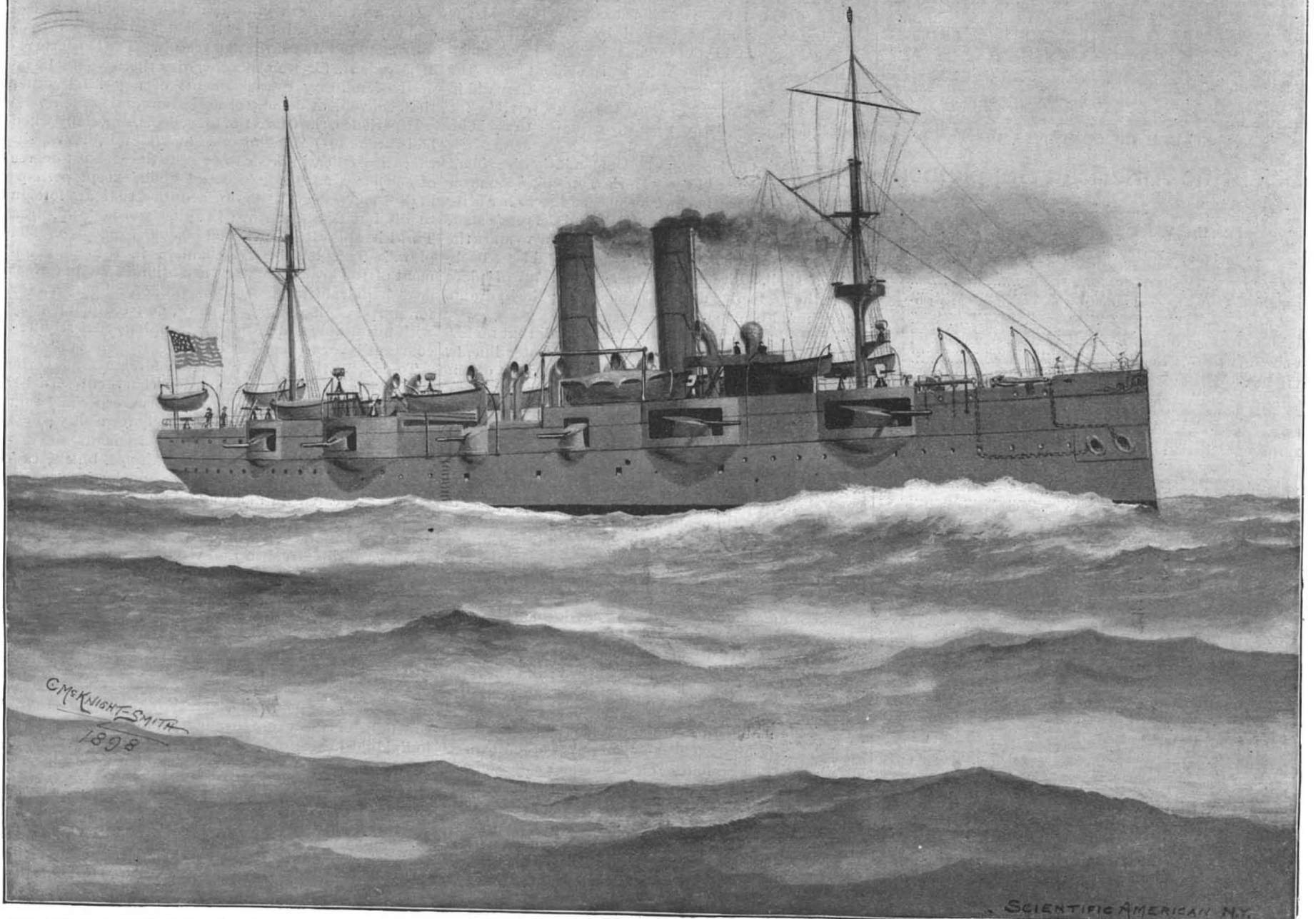
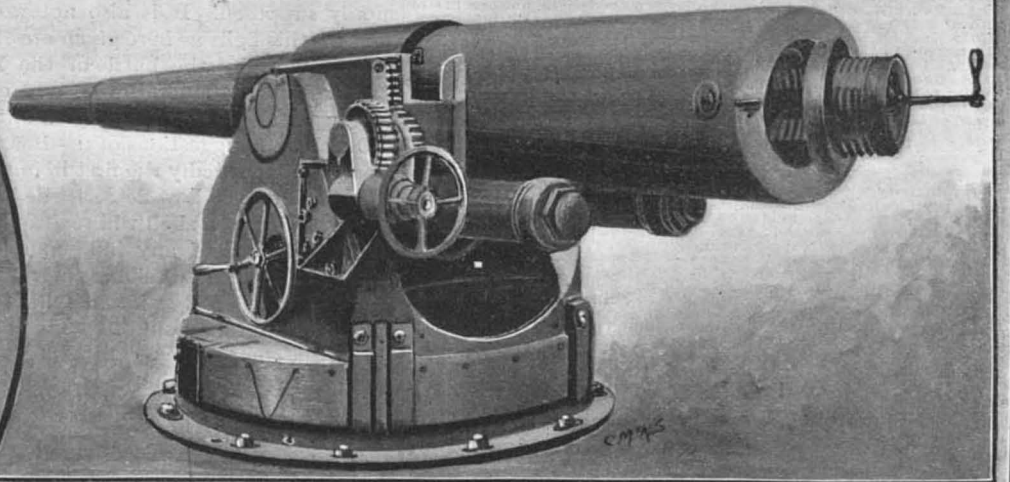
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ONE OF THE NEW BATTERY OF 6" RAPID FIRE GUNS



DISPLACEMENT, 4,085 TONS. SPEED, 19 KNOTS. MAXIMUM COAL SUPPLY, 809 TONS. COMPLEMENT, 384. ARMOR: Deck, 2 to 3 inches. GUNS: Main battery, twelve 6-inch rapid-fire; secondary battery, eight 6-pounders, two Colts, two 87-millimeter guns, one 3-inch field gun. AUTHORIZED 1885.

UNITED STATES PROTECTED CRUISER "NEWARK," AS RECONSTRUCTED.—[See page 54.]



### THE RECONSTRUCTED CRUISER "NEWARK."

It is a peculiarly fortunate circumstance that the earlier ships of our new navy were given such good speed and steaming radius that they are in this respect nearly up to the average of the cruisers of the present day. The principal advance which has been made in the intervening ten or fifteen years since they were designed has been in the improvement of the speed and power of the armament. The construction of hulls, engines and boilers, while it has improved, has not advanced so greatly as to render the motive power of such ships as the "Newark," "Philadelphia," "Baltimore," etc., obsolete in the fullest sense of the term; and the worst that can be said against the horizontal engines is that they are not quite so economical as the vertical engines of the present day.

Of the protected cruisers of our navy that have undergone or are now undergoing reconstruction, or will be reconstructed as soon as the close of the war releases them from duty, we have eight ships, as follows: "Atlanta," "Baltimore," "Boston," "Charleston," "Chicago," "Newark," "Philadelphia," and "San Francisco." The "Boston" and "Atlanta" are of 3,000 tons displacement and 15½ knots speed. The former was present in her original form at the battle of Manila Bay. The "Atlanta" is now undergoing refitting at the Brooklyn Navy Yard. The engines and boilers will be overhauled and the speed will remain the same—too low of course to enable her to rank as an up-to-date ship; but her offensive powers will be greatly augmented by the substitution of new 6-inch rapid-fire guns for her old slow-firers. A similar change will be made in the "Boston."

The "Chicago" will shortly sail from the New York Navy Yard practically a new ship, her shell being about all that will be left of the old vessel. New engines and boilers will raise her speed from 16.3 to about 19 knots; her protective deck will be extended the full length of the ship, and a powerful battery of fourteen 5-inch rapid-fire guns will replace the old 5 and 6-inch slow-firers. Similar changes will be made as opportunity offers on the "Baltimore," "Charleston," "Philadelphia," and "San Francisco."

The "Newark," which forms the subject of our front page illustrations, was the latest of our reconstructed cruisers to leave our dockyards with an up-to-date rig

and battery. One of the front page cuts shows the ship in the bark-rig which she carried at the time of her visit to European waters as one of the "White Squadron." The "Newark" is one of four vessels which were authorized in the second appropriation made by Congress for the upbuilding of our new navy. The first authorization made in 1883 called for the construction of the "Atlanta," "Boston," "Chicago," and the little "Dolphin." Two years later, the protected cruisers "Newark," of 4,098 tons and 19 knots; "Charleston," of 3,730 tons and 18.20 knots; and two gunboats, the "Yorktown" and "Petrel," were authorized.

The "Newark" was built by the William Cramp and Sons' Ship and Engine Building Company, of Philadelphia. The contract for her construction was signed October 27, 1887, or two years and seven months after the date of authorization. The keel was laid June 12, 1888, she was launched twenty-one months later, on March 19, 1890, and went into commission February 2, 1891, or not until six years after Congress had given the necessary authority. That was in the early days of the reconstruction period. To-day we could build and equip such a vessel in less than one-third the time.

The "Newark" was, and is yet, 311 feet 7 inches long on the water line, with a beam of 49 feet 2 inches, and a displacement of 4,098 tons on a mean draught of 18 feet 9 inches. She is propelled by twin-screw, horizontal, triple-expansion engines of 8,869 indicated horse power at a speed of 19 knots per hour. She carries a normal coal supply of 400 tons; but her maximum bunker capacity is 809 tons. Although her mean draught is given as 18 feet 9 inches, her maximum draught at the lowest point of the keel when the ship is ready for sea with full bunkers is 22 feet 7½ inches.

Her original main armament consisted of twelve 6-inch slow-fire guns, of 30 calibers, which fired a 100-pound shell with the muzzle velocity of 2,000 feet per second and the small muzzle energy of 2,773 foot-tons. The secondary battery was made up of eight 6-pounder and four 1-pounder rapid-fire guns, four Colts, and one field gun. She is protected for her whole length by a steel deck which is 2 inches thick on the flat and 3 inches on the slopes along the sides. Her complement of officers and men is 384. The main battery is carried entirely upon the main deck, the guns being spon-

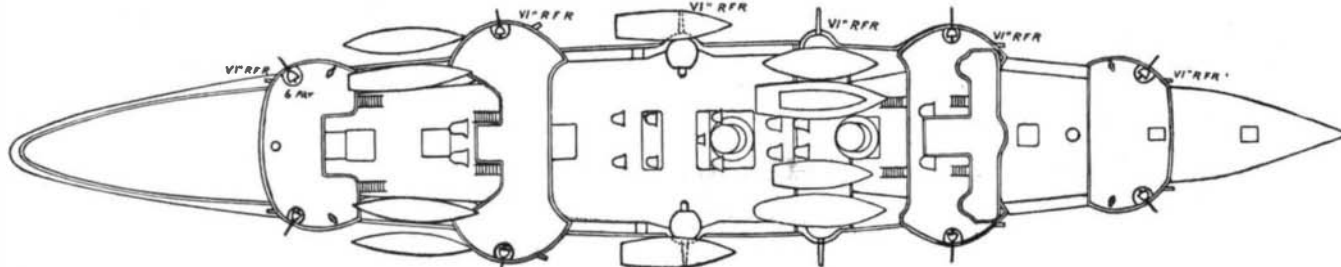
soned out considerably from the sides, so as to secure a strong concentration of fire fore and aft.

It speaks well for the work that was put into this vessel at the Cramps' yard that she should have remained in continuous service for six years before being sent to the navy yard to refit. The work was carried out at the Norfolk yard, under the supervision of Naval Constructor Albert W. Stahl, to whose courtesy we are indebted for the following particulars of the very extensive changes which were made, especially in her armament and magazines.

When we bear in mind that the repairs and improvements were carried out at a time when the necessities of the existing war were calling for the services of the ship, great credit is due for the amount of work that has been done mainly in the past ninety days. So far as mere repairs are concerned, Mr. Stahl removed all woodwork from the neighborhood of the guns; put down a new main deck; built an improved and very much more efficient pilot house; overhauled and put in complete order the system of pumping and drainage; built a new fire main running under the protective deck, instead of as in the original ship above the berth deck, thereby rendering it more secure against the effect of gun fire; overhauled and put in good order all the thousand-and-one fittings, boat davits, search-light stands, watertight bulkheads, doors both watertight and non-watertight, inner bottom, steering engine, anchor engine, ventilation blowers, winches, hatches and hatch covers, flood cocks to magazines, all sea valves; and practically overhauled and refinished every part of her from keel to truck.

It will be noticed that the placing of the fire mains below the protective deck is in direct line with the suggestions of the naval board which examined the wrecks of the Spanish fleet, reference to which is made in our editorial columns.

So far as the changes and improvements are concerned the most important is in her battery. The substitution of the new type of 6-inch rapid-fire for the old slow-fire guns not only provides the "Newark" with a



DECK PLAN OF THE "NEWARK."

more powerful weapon, but one that can fire three or four times as many shells in a given space of time, as will be seen from the following comparison:

	Length in Calibers.	Total Length.	Weight.	Muzzle Energy.	Rounds per Minute.	Total Energy of One Projectile Per Min.
6-inch slow-fire...	30	Feet. 16.3	Tons. 4.8	Tons. 2,773	2	33,276
6-inch rapid-fire..	40	21.3	6	3,700	6	133,200

The reconstructed "Newark," then, is about four times as powerful in the amount of shell-fire which she can deliver as she was before she went to the Norfolk yard.

As a direct consequence of these changes, and in order to make the rapid-fire guns efficient, eight electric ammunition hoists were installed for bringing the 6-inch ammunition to the guns, these hoists being designed so as to hoist both powder and shell, and to deliver nine rounds per minute. The hoists had to be designed, material ordered, special electric motors built for the purpose, and the whole apparatus installed at the highest possible speed. We are informed that on the first test they gave great satisfaction, delivering as high as fifteen rounds per minute on the main deck, a speed in excess of the capacity of the guns to use the ammunition. Closely related to this change in ammunition hoists was an entire rearrangement and change in magazines so as to make it possible to deliver the ammunition to the hoists with the proper rapidity. Taken altogether, her main battery, with electric hoists, and her fine magazines, is a most effective combination, and one that has already given excellent results in the operations off Santiago. The present secondary battery consists of eight 6-pounders, two Colt's automatic, two 37-mm. guns, one 3-inch field gun.

Among the other minor alterations of design was the change in rigging. The vessel was originally bark-rigged, but all the yards and heavy topmasts have been removed and a simple pole rig substituted, carrying pole foremast and pole mizzenmast; the mainmast, as being not necessary and somewhat dangerous in action, was entirely removed from the vessel.

No radical change was made in her main engines and boilers, but both were thoroughly overhauled and put

in perfect order, the latter being secured on new and better saddles. A good arrangement of evaporators and distilling plant was also installed.

Taken altogether, the reconstructed "Newark," as represented in our engraving, with her powerful battery, excellent ammunition facilities, and good speed, can compare favorably with the more modern cruisers of the same displacement.

### Possession Island and its Birds.

Off the southwestern coast of Africa, about 500 miles from Cape Town, lies a group of sea-washed rocks, to the largest of which the title of Possession Island obtains. This latter, a few miles away, looks uncommonly like a drab colored clinker set down in mid-ocean; it is crescent shaped and shelters Elizabeth Bay from the westward, the mainland being well defined in the distance. On nearer approach, one experiences a sensation much akin to that induced by a theatrical transformation scene, the forbidding and apparently untenanted waste being alive with birds enjoying to the full the immunity secured from predatory foes, and showing but little sign of timidity from outside intrusion. Thousands upon thousands of penguins line the shore, strutting about with great self-importance, and jealous, one might almost imagine, that Nature has not endowed them with the power of flight, like their comrades, the malagas, a very handsome bird about the size of an ordinary goose, and with much the same plumage, except that the head and neck are tinted with yellowish feathers. Enormous flocks of these malagas are to be seen in every direction, either standing in solid groups, covering a large extent of ground, or wheeling about in the air, now and then darting out seaward in quest of fish, upon which they pounce with unerring accuracy. Then there are various kinds of gulls, guillemots and other sea birds. In July and August is the breeding season, and it is not till later in the year that the islands are what is technically called "in full bloom," when the birds are more numerous than ever.

Some of the habits of the penguin are very peculiar.

The nest consists of a hole scratched in the sand, or just a crevice in the rock, into which are dragged a few stones, pieces of seaweed, or any rubbish available; and here are deposited two—or at most three—eggs,

the period of incubation lasting six weeks. When the birds are hatched, they very quickly take to the water.

Shortly after the breeding season is concluded the work of collecting the guano begins by those who have acquired rights on the island, and this furnishes employment for thirty or forty hands, the ranks being recruited from all sorts and conditions of men—even a broken-down barrister has been known to cast in his lot amid these untoward surroundings. Yet even the hard labor entailed in guano collecting is not without its compensations, for the island is in a comparatively rainless latitude, and though it presents a wearisome and monotonous picture of barren-looking rocks alternating with long, arid stretches of sand-dunes washed by an angry surf, the atmosphere is singularly pure and invigorating—one feels as if it were almost a luxury to breathe; and when night closes the starry heavens present a glorious spectacle to the eye, while all around the sea flashes and sparkles with the phosphorescent rays emitted by countless forms of marine life.

At one time the island must have been the haunt of innumerable numbers of seals, for the remains of these creatures are to be seen in all directions, abundantly confirming the statement that a few years back a pestilence or plague visited the oceanic inhabitants of this locality, and evinced as much virulence and malignity as Asiatic cholera sometimes does toward bipeds on land. Shortly after the advent of this plague, a visitor to this group of rocks found them literally covered with the carcasses of fur seals with their skins still on them, the flesh having undergone a species of drying and mummification.—Chamber's Journal.

PURDUE UNIVERSITY has a new building in the process of erection which will constitute an addition to the present engineering laboratory, says The American Engineer and Car Builder. The new portion is 50 by 100 feet in size, is located between the steam engineering laboratory and the locomotive laboratory, and is to be connected by passageways with both of these buildings. The addition is to be known as the railway laboratory, and is the last of the series of engineering laboratories which were provided for in the original plan of the present group. The Purdue engineering laboratory now includes seven large laboratory rooms: A woodworking room, foundry, forge room, machine room, steam engineering laboratory, locomotive laboratory, and railway laboratory.