THE LATEST BRITISH ARMORED CRUISER "GOOD HOPE."

Great interest attaches to the fine armored cruiser which forms the subject of our front page engraving, from the fact that she is the first of a class of extremely fast and powerful armored cruisers which are now under construction for the British government. The vessel is really an improved "Powerful," with all the good points and none of the defects of the "Powerful" and "Terrible," and with certain added excellencies which render her probably the best, all-round fighting ship that has ever been turned out from the English yards.

The "Powerful" and "Terrible," launched in 1895, were at that time by far the largest and swiftest cruisers afloat. They had the defect, now well recognized, that they depended for protection entirely upon an armored deck, no vertical side armor whatever being provided; while their armament was a weak one relatively to the great displacement of 14,200 tons. They showed on trial a speed respectively of 22.4 and 22.1 knots an hour. Their best feature was their enormous coal capacity, 1,500 tons normal, and 3,000 tons bunker capacity. The "Good Hope" and her sister vessels, the "Drake," "King Alfred" and "Leviathan," have practically the same dimensions, viz.: Length, 500 feet; beam, 71 feet; draft, 26 feet, and displacement, 14,100 tons. They have, however, a belt of side armor of Krupp steel which is nearly 400 feet in length, extending from the bow aft. For 280 feet of this length the belt is 11 feet 6 inches broad, and from 6 to 4 inches in thickness. At the forward end the belt increases in width to 24 feet, the thickness being reduced to 2 inches. At the after ends of the belt there extends from side to side a bulkhead of 5-inch steel, the after 105 feet of the ship, though it is without vertical plating, being protected by a 2½-inch deck, which shelters the steering gear and magazines from shell fire. To the vertical side armor protection there is added two protective decks, the upper one 1½ inches in thickness, the lower one 1 inch in thickness.

As compared with the "Powerful," the "Good Hope" has about 1 knot more speed, to attain which the indicated horse power, as named in the contract, has been raised from 25,000 to 30,000, and, unlike the earlier ships, the "Good Hope" more than fulfilled the expectation of her designers; for on an eight-hour full power, steam-trial in the English Channel, she maintained an average speed, as a mean of five runs, of 23.05 knots per hour, the mean collective indicated horse power beng 31,071.

In point of armament the "Good Hope" is, in general, similar to the "Powerful," with the important exception that she carries four more of the effective 6-inch rapid-fire guns, her total armament being as follows: Two 9.2-inch guns mounted one forward and one aft on the upper deck and protected by a 6-inch shield and barbettes. Sixteen 6-inch rapid-fire guns of the new Vickers' type carried in eight, two-storied armored casemates; twelve 3-inch rapid-fire guns, besides several smaller rapid-firers distributed on the bridges and superstructures. The coal supply is generous, consisting of 1,250 tons normal and a full bunker capacity of 2,500 tons.

It is interesting to compare this cruiser with our own armored cruisers of the "West Virginia" type, which on a displacement of 420 tons less have the same thickness of armor protection except the deck, which is about an inch and a half heavier; one knot less speed; about 500 tons less coal capacity, but which carry a somewhat heavier armament, consisting of four 8-inch, fourteen 6-inch, eighteen 3-inch and twelve 3-pounders, besides several lighter rapid-fire guns. The two new armored cruisers which are to be laid down for our navy this year and are as yet, we believe, unnamed, are considerably more powerful than the "Good Hope." They are of 14,500 tons displacement, 22 knots speed and will carry a complete belt which, with the shield and barbette protection of the guns, will be considerably heavier than that on the "Good Hope." The armament, moreover, will be much more powerful, including four 10-inch guns carried in pairs in two barbettes, one forward and one aft, on its upper deck, and sixteen 6-inch guns, carried behind what will probably be a complete wall of side armor, extending from the belt to the upper deck. Added to these will be over twenty of the effective little 3-inch rapid-fire guns. The normal coal supply will be 900 tons, and the total bunker capacity 2,000 tons. So powerful will be these new cruisers that they may well be included in the battleship class, since many of the foreign battleships carry 10-inch guns in their main barbettes and the latest battleships of the German navy have nothing heavier aboard than the 9.45-inch gun. Altogether these new cruisers of our navy promise to be the most effective fighting ships yet turned out by our designers, in which respect they will hold the same position in our navy as is held in the British navy by the fine vessels of the "Good Hope" class. It should be mentioned in closing that this vessel was presented to the British government by Cape Colony, and hence its name. We are indebted to the builders, the Fairfield Company, of Glasgow, for the illustrations of the ship and engines.

Automobile News.

After five days' trial a jury in the United States Circuit Court on October 7 awarded $12,070 damages to Joseph B. Hughes, of New York, in his suit against Felix Warburg. Mr. Hughes collected damages for injuries sustained by the running away of his horses, which were frightened by Mr. Warburg's automobile at Seabright, N. J. One of the horses was killed and Mr. Hughes permanently injured. Mr. Warburg himself was not in the automobile at the time of the accident.

In one of the leading English periodicals Mr. B. H. Thwaite, C. E., projects an automobile highway from London through the center of England to Carlisle, and thence to Glasgow, Edinburgh and Inverness. The road would have a foundation of concrete and a surface of specially hard creosoted wood blocks with asphalt joints, the surface curvature being sufficient for thorough and rapid drainage. Its central portion would be used exclusively by motor cars, and there would also be side paths for bicyclists. Mr. W. K. Vanderbilt, Jr., is authority for the statement that a similar road is soon to be built in this country from Long Island City to Roslyn, a distance of twenty miles. This road will be entirely on private ground, and will be designed for speeding purposes mainly.

The many accidents recently from fast speeding in France have caused Mons. E. Hospitalier to give, in La Locomotion, some interesting facts as to the inertia of a 2,000-pound automobile traveling at the rate of 75 miles an hour, and the braking power required to stop it. Calculation shows the inertia of the vehicle to be no less than 60,000 kilogramme-meters, or the same that it would have if it fell a distance of 196 feet, the height of the towers of Notre Dame Cathedral. This energy is equivalent to that of a complete train on the Paris underground railway, traveling at its highest speed of 21¼ miles an hour. When a brake is applied capable of a resisting effort of 551 pounds per ton at the rim of the wheels, the retarding power of this brake is, during the first instants, equivalent to 113 horse power. The mean power developed by the brakes while they are applied reaches nearly 60 horse power. And all this terrific strain is transmitted through the frail pneumatic! The wonder is that the tires stand up as well as they do, and that accidents caused by their bursting are, comparatively, so few and far between.

One of the great troubles that automobilists have to contend with is loose nuts on their machines. Mr. Vincent C. Bryce, an experienced mechanic, patented some two years ago a special form of lock nut in which are combined the principles of the lever, the screw and the wedge. The nut is in two parts, an inner tapered core that screws on the bolt and an outer shell that fits over the inner core. The two pieces fit together and form one nut, which can be screwed in place or unscrewed as easily as an ordinary nut, but will never work loose. The nut has been tried on some of the Pennsylvania Railroad locomotives for fastening connecting rods, and has proved an unqualified success. We have also tested a number of them on a gasoline automobile, and found them all that they are claimed to be, and a boon to all chauffeurs. The Columbia Lock Nut Company, of Bridgeport, Conn., are the manufacturers.

A commission of Belgian army officers has recently tested a new automobile tractor which is to be used in the Congo region over the Songololo-Popokabaka route, which was laid out by Commandant Carton with 300 native laborers. The vehicle weighs 3.3 tons empty and will carry a 2-ton load, or 60 packages of the type usually made up for Central Africa, weighing 65 to 75 pounds each. The tires of the rear wheels are 16 inches wide. Control of the vehicle is easy and a speed of one mile in 8.3 minutes is reached. The principal tests were made at Ensival, and the vehicle covered a distance of 13 miles, the steepest grade being 14 per cent. In these trials 5.5 gallons of an alcohol and gasoline mixture in equal proportions were consumed. The consumption was about 0.4 gallon of combustible per mile with a load of 5 tons gross, or 2 tons net, making a cost of $0.013 per ton-mile of gross load, or $0.03 for net load. The distance from Songololo to Kwango is 180 miles, this being the route to be covered, and allowing a speed of 3 miles an hour during 10 hours per day, it would require 6 days to make the single trip. The round trip will therefore require about two weeks, counting the time of loading and unloading, or per year the vehicle can make 24 trips. If this automobile is found to work successfully on the road, there is no doubt that others will be added, and it is estimated that six of these tractors would transport at least 150 tons annually, which would be a great benefit to the traffic of the region.

Correspondence.

The Spider at Work.

To the Editor of the Scientific American:

Two interesting articles in late issues of your journal prompt me to state that I have made many efforts to ascertain how a spider spins his web from one tree to another.

Spiders are very shy and work mostly at night. Hence my efforts were fruitless for a long time. Finally I captured a spider and confined him in a glass jar. I fed him bountifully, and gave him such attention as to quiet his fears. Often I would take him out into the open air and observe his actions.

If it were cool, damp or windy weather, he would reluctantly leave his quarters. But if it were warm, dry and calm, he readily came forth, and his excited, eager actions gave evidence of the possession of that innate love of liberty peculiar to all animated creatures. On such occasions he was ever upon the alert to escape. I carried him upon my hat or walking cane, held out horizontally.

He would attach a web to the cane and then drop like a flash in order to escape. I always anticipated him and thwarted his plans. He would hang by the web, which he knew would sustain his weight, until I rescued him. I am satisfied that he estimated the distance to the ground, and that he would have succeeded in escaping had I not raised the cane. He would climb up his web and at the same time roll it up. Often I saw him take up a web, roll it into a pellet or ball and store it away, presumably for future use. He seemed to shrink from sunshine, preferring a dense shade, and refused to work while the wind was blowing.

His actions were most interesting when I would cast a living fly into his quarters. Cautiously he would approach it, dexterously capture his prey, and bind him, I believe, with bits of web formerly used and stored away.

In favorable weather he would raise his head and turn to every point of the compass. Whenever I approached a bush he would become excited. I have always believed that spiders depended upon currents of air to transport their cables, but I lacked the proof. Finally my patience and persistence were rewarded. One day, about four o'clock in the afternoon, when the thermometer stood at about 85 degrees in the shade, and the air was so calm that I could not feel any current, although there was a slight movement in the air from northeast to southwest, I selected a place about 12 feet from a wire fence with green bushes in the rear. Here I had the benefit of the sunlight to observe my spider. His actions proved that he appreciated the favorable situation at its true worth. Poised upon the end of my cane, he set his spinneret in motion. I could see the web floating away with every undulation, glistening in the sunlight as it went on directly to the wire. When it caught the spider stopped immediately. His subtile sense of touch told him of his success. Forthwith he began to haul away on his cable until it was taut and fastened to the cane. Then he went over the tight web like one who loves liberty and values time. I thought he had earned his freedom, and likewise that I had gained the information which I so much desired.

W. T. Hollis.

Rison, Ark., September 26, 1902.

The Besetting Perils of Venetian Structures.

A correspondent of the London Times has made some astonishing statements in an article on Signor Boni's work in restoring the monuments of Venice. He says that the church of St. Mark, the Doge's Palace, the Procuratie Vecchie, the Zecca, and the churches of Santa Maria Gloriosa, dei Frari, and SS. Giovanni e Paolo need prompt attention if they are not to share the fate of the Campanile. Although too much credence cannot be given to many of the wild rumors of the condition of Italian monuments, it can hardly be denied that the Campanile catastrophe has aroused justifiable distrust of the competency and diligence of Italian engineers. According to the Times correspondent, the Doge's Palace reveals diagonal lesions behind the bookcases of the Biblioteca Marciana; it seems as if the brickwork were tumbling inward. In the Procuratie Vecchie are several serious cracks, caused probably by the wholesale demolition of the internal walls and the stacking of heavy goods in the rooms above the colonnade. The correspondent comments on the folly of the civil engineer corps which is preparing to remove the Biblioteca Marciana to the Zecca. The latter building is already in a sorry condition.

If Venice should really lose these architectural monuments, her doom may be said to be sealed. Commercially, the city is of little importance. Venice has lived simply by reason of her artistic attractiveness; and when that is gone, it is doubtful if European tourists will visit the old city of the Adriatic.

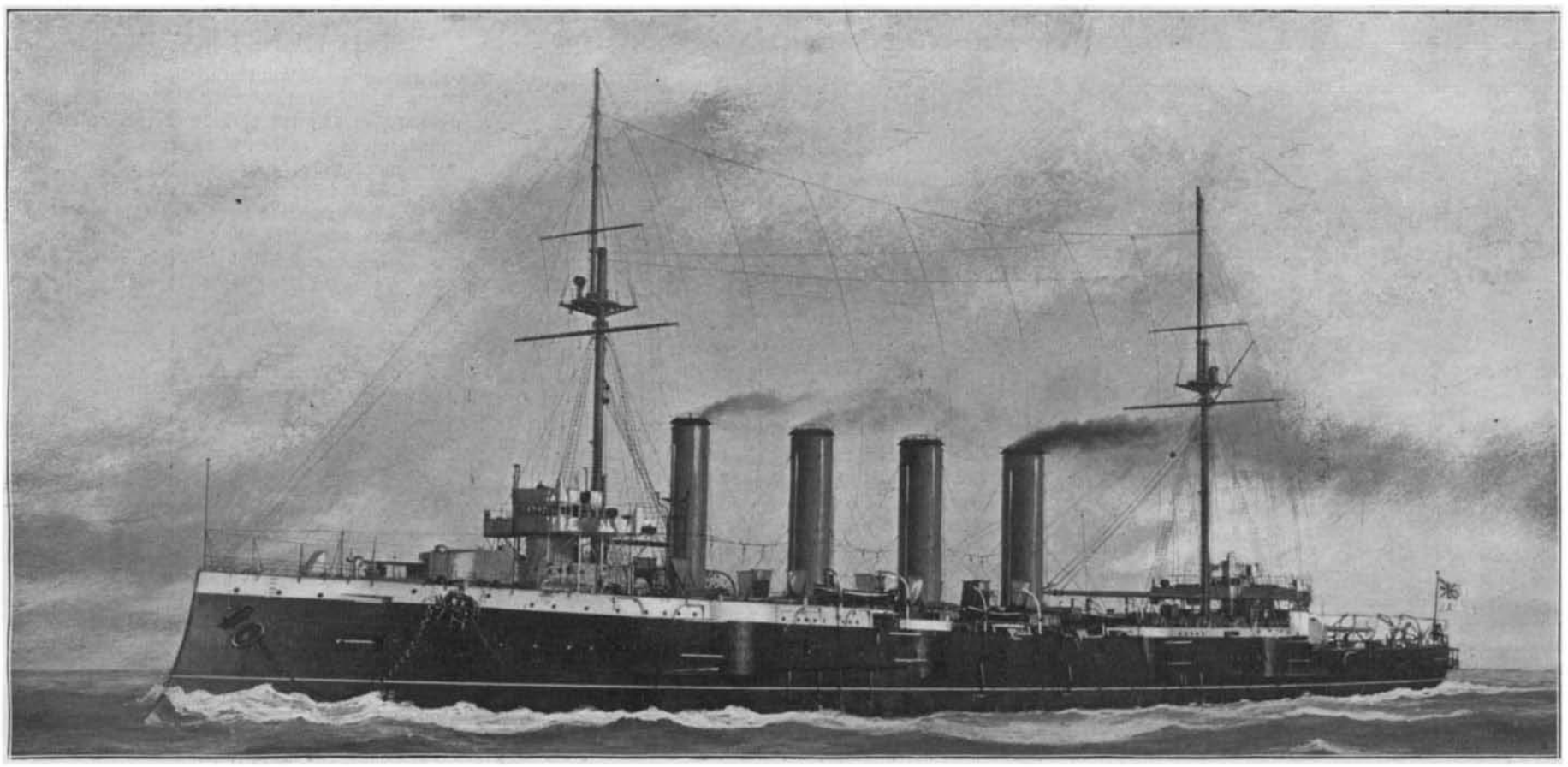
SCIENTIFIC AMERICAN

[Entered at the Post Office of New York, N. Y., as Second Class Matter. Copyright, 1902, by Munn & Co.]

Vol. LXXXVII.—No. 16.
ESTABLISHED 1845.

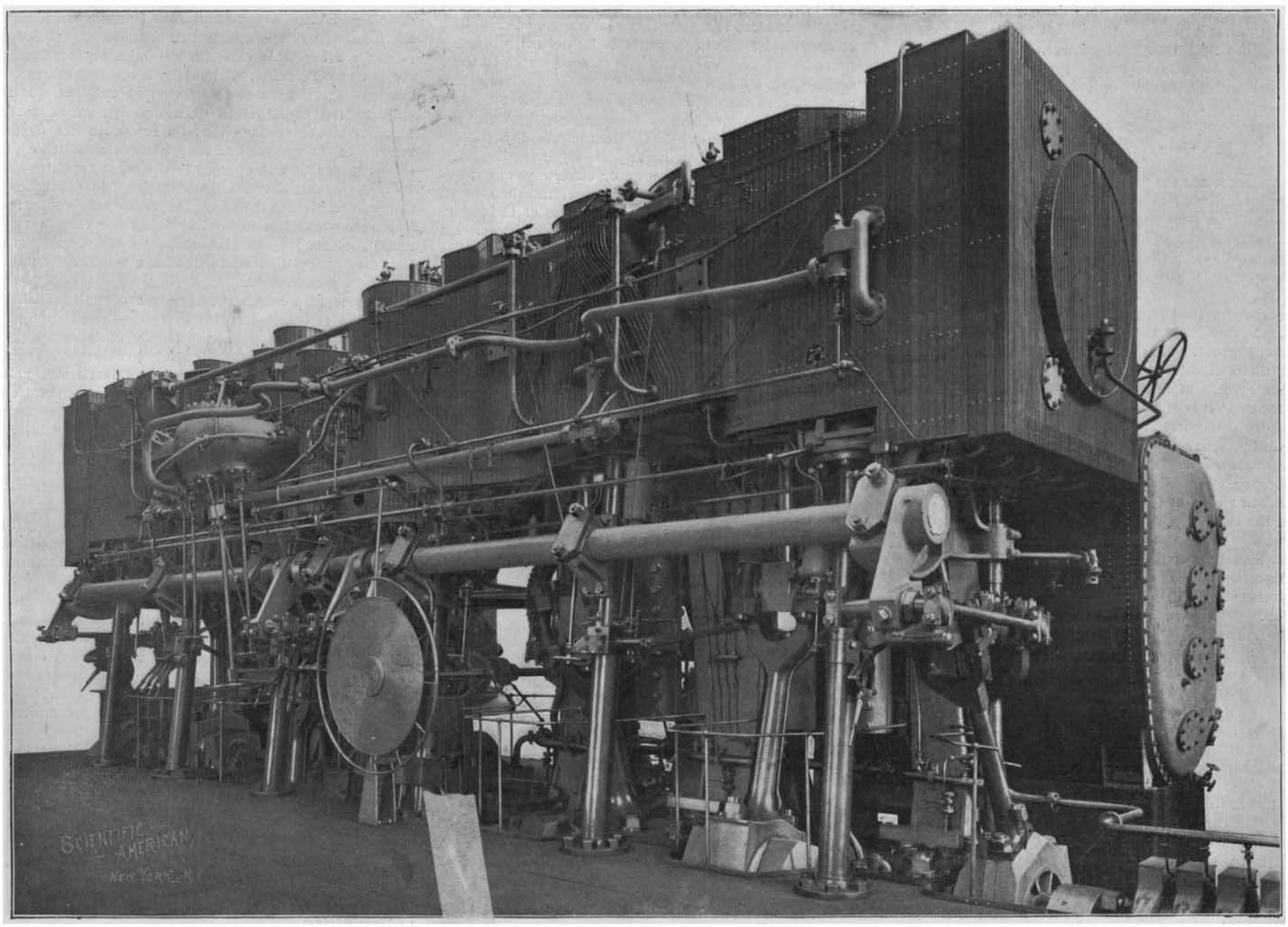
NEW YORK, OCTOBER 18, 1902.

$3.00 A YEAR.
5 CENTS A COPY



NEW BRITISH ARMORED CRUISER "GOOD HOPE."

Displacement, 14,100 tons. **Speed,** 23.05 knots. **Maximum Coal Supply,** 2,500 tons. **Armor,** belt, 6 inches, gun positions, 6 inches. **Armament,** two 9.2-inch; sixteen 6-inch rapid-fire; twelve 3-inch rapid-fire. **Torpedo Tubes,** 2. **Complement,** 900.



ENGINES OF THE "GO PE." INDICATED HORSE POWER ON TRIAL, 31,071.—[See page 257.]