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H. M. S. BENBOW.

The new armor-clad barbette ship Benbow, built by the Thames Ironworks and Shipbuilding Company, was delivered on the 26th of August into the charge of Captain Buller, at the entrance of the Royal Albert Docks, and proceeded in charge of that officer to Chatham Dockyard, where she will receive her armament, preparatory to being put in commission. The Thames Company, which is contractor to the Government for the supply of both ship and engines, has been working early and late to complete its contract within the specified time, and Messrs. Maudslay, to whom the contract for engines has been sublet by the Thames Company, being also under contract to complete by date, in order that the vessel might steam from the works down the river.

The Benbow is one of the six vessels of the Admiral class, so called from bearing the names of six of our famous admirals—Anson, Collingwood, Camperdown, Howe, Rodney, and Benbow. They are all barbette ships, the guns being mounted inside a fixed circular breastwork of thick armor plating, wherein the gun revolves on a turntable, and fires over the breastwork. The barbettes are placed one at each end of the superstructure, or midship battery, and the guns have each a clear range of 230 deg., viz., from 25 deg. abaft the beam to all round the bow or stern to 25 deg. on the opposite side, and converging upon an object on the broadside at about fifty yards.

The Benbow has been chosen as one of the six vessels of this class to mount two guns of 110 tons each, one being mounted in each barbette; whereas, in the other five vessels, two guns are carried in each barbette, but of 63 tons only instead of 110 tons. These terrible engines of warfare would be most destructive in action, and are, in fact, formidable weapons, but in some quarters such enormously large guns are not viewed with much favor. England, in the matter of adoption of such heavy guns, has been following in the wake of Italy.

In addition to the two 110 ton guns, the Benbow car-

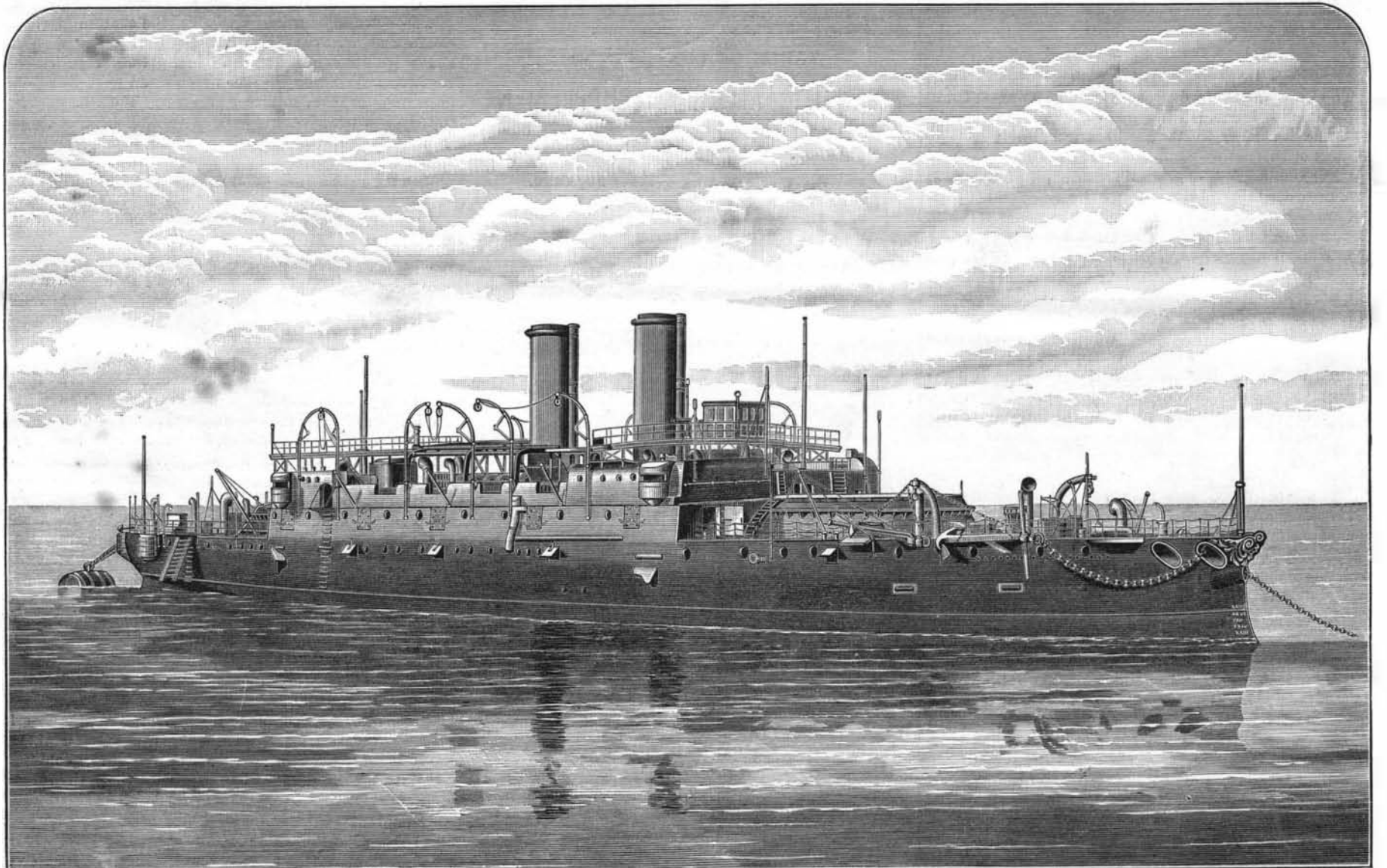
ries a battery of ten 6 in. guns, twelve rapid-firing guns, and fourteen machine guns, these latter very conveniently arranged for use against torpedo boats. She is also fitted with four torpedo ports on the broadside and one through the upper part of the stern, all above water. The Benbow was launched on June 15, 1885, and has since that date been lying near the works for the purpose of receiving her machinery and boilers, and for the completion of the multitudinous fittings of a modern ship of war. It would be impossible to describe on paper the character of such fittings, including the pumping, draining, and ventilating, some 180 separate compartments, each compartment being fitted with an automatic valve, where the ventilating pipe or trunk passes through, so that in the event of the water entering any one compartment, and rising to the height of the trunk—the trunk being assumed to be possibly damaged—the water would close the valve, and so be confined to the damaged compartment.

Some idea of the complication of the gearing in a modern war vessel as fitted in England may be obtained when we state that no less than 83 water-tight doors and armor deck shutters are fitted in this vessel, in addition to 85 water-tight doors that open and close by hand without gear. The deck plates, to which indicators are fitted, showing when each door or valve is open or closed, amount to no less than 250, in addition to the two automatic valves above named. Then, including the main engines, fan engines, pumping engines, electric light engines, steam steering and capstan engines, there are no less than forty separate sets, all to be kept in proper going order, requiring all the care Mr. White, the chief engineer, and his able staff are able to bestow upon them. Mr. Yates, of the Royal Naval Corps of Constructors, has had the inspection of the Benbow, aided by a staff of assistants, to see that the company fulfills its contract; and any one comparing the Benbow with any of the sister ships will see that the full "pound of flesh" has been demanded and readily given, the Thames Company, ever since it built the Warrior in 1861, having maintained its reputation as

builders of first-class naval constructions, and to this day retains its oldest connections in almost every nation.

The dimensions of the Benbow are as follows: Length, 330 ft.; breadth, 68½ ft.; and depth, 37 ft. The engines, supplied by the well-known firm, Messrs. Maudslay, Son & Field, are of the three-cylinder compound type, of 7,500 indicated horse power, and reaching 9,000 with forced draught, giving an estimated speed of 16 knots. The Benbow, like other ships of this class, is of the citadel type; this means that the vital portion of the vessel for about half of her length is protected by being included in an iron box armored with 18 in. plates on the side, the top of which at full draught is 2½ ft. above and 5 ft. below water, giving a total depth of 7½ ft. The athwartship bulkheads forming the two ends of the citadel are 16 in. thick; before and abaft these there is an armor deck of 3 in. steel plating. Except for this steel deck, which is calculated to shield all below it from the fire of very heavy guns, the ends of the vessel are unprotected, and in a heavy engagement the superstructure would suffer severely. In the case of other types of war vessels, protection is afforded by a belt of armor plating all fore and aft, being thickest amidships and tapering toward the ends. But it is evident that all that could be done on the dimensions and displacement of the Benbow has been done; for in order to provide for the armor deck and additional freeboard of the Nile and Trafalgar, the displacement tonnage has had to be increased by 2,000 tons, making them 12,000 tons displacement instead of 10,000, as in the Benbow.

Recently, in the presence of Mr. Joshua Field and Mr. Hayward, the manager of the Thames Iron Works, the steam was for the first time admitted into the huge cylinders, when immediately the engines in both engine rooms started almost simultaneously, and continued steaming for three hours, thus showing that all was in perfect order and the vessel capable of making her short cruise to Chatham. The Sans Pareil, a sister vessel to the Renown, building at Newcastle, a vessel



10,000 tons displacement; 9,000 H. P.; speed, 18½ miles per hour; two 110 ton guns, ten 6 in. guns; four torpedo ports.

H. M. BARBETTE IRONCLAD SHIP BENBOW.

of somewhat similar dimensions to the Benbow, is making rapid progress at these works, and is to be launched in the spring of next year; some 3,000 tons of material being already worked into place on the slip previously occupied by the Benbow, sixteen of the massive armor plates already in place weighing twenty tons each. The huge wrought iron sternpost for the new Italian armorclad Re Umberto is being forged and machined at these works also, which, considering the dearth of work everywhere, appear to be fairly busy.—The Engineer.

James G. Wakley, M.D.

Dr. James Goodchild Wakley, for the last twenty-five years editor of the Lancet, died at his residence, Heathlands Park, Longeross, England, on the 30th of August.

Dr. Wakley was born in Thistle Grove, Brompton, in December, 1825, and was the youngest son of Thomas Wakley, M.P., the founder of the Lancet. He was educated at a private school at Hanwell and at University College School, London. His professional training was obtained at University College. He was graduated as doctor of medicine at King's College, Aberdeen, in 1852. He never engaged in medical practice, but, when about thirty years of age, began under his father's guidance a journalistic career. He was soon intrusted with a large share of editorial responsibility, and about the year 1859 became actual, though not nominal, editor of the Lancet. It was not till his father's death, in 1862, that he took this designation, becoming at the same time half proprietor of the journal with his eldest brother.

The editorial life of Dr. Wakley was one of peculiar devotion to his work. He not only maintained, but extended, the reputation that the Lancet had acquired under its founder's direction for earnestness of purpose, strict integrity, and unselfish zeal for the public good and for the welfare of the best and permanent interests of the medical profession.

He was essentially a journalist, and to make the Lancet effective he spared no pains, night or day, summer or winter. His first care was to make his journal the exponent of the views of medical men in every part of the kingdom and of the empire; and so long as such views came out of honest observation and practical experience, they commended themselves to Dr. Wakley, and found a place in the Lancet, notwithstanding they might not always be perfect in form or demonstration.

Dr. Wakley made no pretensions to great learning or a deep acquaintance with science, but he had an ample store of common sense, and a faculty of very quickly and surely gauging professional opinion. He was singularly free from personal or malicious feeling, though strongly tempted thereto occasionally in the conflict raised by the reviews and criticisms of the journal for which he was responsible.

The Store Order Act Invalid.

The Supreme Court of Pennsylvania, sitting at Pittsburgh, on Oct. 4, decided the anti-store order system act of June 29, 1881, to be unconstitutional. The provisions of this act we condense as follows:

"Persons mining or manufacturing, or either, coal, ore, or other mineral shall pay their employes in lawful money, or by order redeemable at its face value in lawful money by the issuer within thirty days. Violation a misdemeanor, punishable by fine up to \$100, to go to school fund. Employes interested in merchandising are not to make a greater profit on goods than outside dealers in like articles. Violation makes the debt uncollectible from employe. Employers refusing for twenty days to pay employes regularly or to redeem orders shall pay one per cent a month, if suit be brought for the amount due."

The court said: "The act is an infringement alike of the rights of the employer and the employe. More than this, it is an insulting attempt to put the laborer under a legislative tutelage which is not only degrading to his manhood, but subversive of his rights as a citizen of the United States. He may sell his labor for what he thinks best, whether money or goods, just as his employer may sell his iron or coal, and any and every law that proposes to prevent him from so doing is an infringement of his constitutional privileges, and consequently vicious and void."

American Gaslight Association.

This association held its fourteenth annual meeting in Philadelphia, October 20 and 21. It was called to order by its president, A. C. Wood, of Syracuse. A paper, followed by a long discussion of State gas commissions, filled the first day, the conclusions being favorable to the creation of these bodies. Various papers on technical points were given. The second day opened with a paper on natural gas, which was read by W. H. Denniston, of Pittsburg, Pa. In that city alone 38,000,000 cubic feet are consumed daily. After the reading of other papers the convention adjourned sine die. A banquet was partaken of in the evening by the members.

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(Illustrated articles are marked with an asterisk.)

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For the Week Ending October 30, 1886.

Price 10 cents. For sale by all newsdealers.

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THE STATUE OF LIBERTY FINISHED.

As we go to press, the final preparations are being made for publicly dedicating the grandest statue the world has yet seen. The cheerful gift of the people of one great nation to those of another, and yet resulting from the united effort of both, it symbolizes the deep, friendly feeling which, for more than a century, has existed between the two. On the 28th inst., eminent citizens of the French Republic will meet on Bedloe's Island the President and most honored citizens of the United States, and together they will perform the ceremonies celebrating the completion of the Statue of Liberty. The work as now seen leaves no room for criticism—the statue itself is grand, imposing, and dignified; while the pedestal is rich and ornate, yet so quiet as to enhance, rather than detract from, the beautiful features of the figure it upholds. The hope of all is that the principle here typified and the friendship of the two peoples may continue for all time.

In the Hold of an Ocean Steamer.

"How long do stokers live?" asked a Tribune reporter of an engineer of one of the swiftest ocean racers that ply between this country and England.

"As long as anybody," was the unexpected reply.

"How do they like their work?"

"If they don't like their work, they get out; there are plenty willing to take their places," was the answer. But it is hard to persuade the average landsman that the stoker's life is not shortened by constant exposure to the extremes of temperature. Transatlantic passengers who have braved the intense heat of the furnaces and visited the fire room wonder how men can endure such a life even for a voyage. The stokers work four hours at a stretch, hemmed in between two long lines of furnaces that keep the temperature ordinarily at 120 degrees, sometimes sending it as high as 160. The space between the furnaces is so narrow that when the men throw in coal they must take care when they swing back their shovels, lest they should burn their arms on the furnaces behind them. The only means of ventilation is one large air pipe that reaches down into the center of the stokers' quarters, and on a big steamer the men have to take the air in batches. On a great ocean steamer like the Umbria, the men come on in gangs of eighteen stokers and twelve coal passers, and the "watch" lasts four hours. The Umbria has 72 furnaces, which require nearly 350 tons of coal a day, at a cost of almost \$20,000 per voyage. One hundred and four men are employed to man the furnaces, and they have enough to do. They include the chief engineer, his three assistants, and ninety stokers and coal passers.

The stoker comes on to work wearing only a thin undershirt, light trousers, and wooden shoes. On the Umbria each stoker tends four furnaces. He first rakes open the furnaces, tosses in the coal, and then cleans the fire, that is, pries the coal apart with a heavy iron bar, in order that the fire may burn freely. He rushes from one furnace to another, spending perhaps two or three minutes at each. Then he dashes to the air pipe, takes his turn at cooling off, and waits for another call to his furnace, which comes speedily. When the "watch" is over, the men shuffle off, dripping with sweat from head to foot, through long, cold galleries to the fore-castle, where they turn in for eight hours. Four hours of scorching and eight hours' sleep make up the routine of a stoker's life on a voyage.

The reporter ran across a group of stokers in West Street, and had a chat with one of them. "I went to sea as a coal passer when I was fourteen years old," he said. "Then I got to be a stoker, and I am now twenty-eight." The speaker was about six feet in height, and weighed 180 pounds or more. His face was ruddy with health, and his eyes beamed with good nature. His robust appearance was in strong contrast to that of his mates who had just landed from a voyage, a pale, streaked out, listless-looking set of men.

"How do we stand the work? Well enough if we get plenty to eat. But the work is terribly hard all the same. It comes hardest, of course, on those who don't follow it regularly. They are the fellows who get played out so badly. I heard once of a young English doctor who came over here on a visit. He got out of money, and was that proud that he wouldn't send home for some. So he worked his way back as a stoker, and got a sickness that he could never get rid of. But if we get plenty to eat, and take care of ourselves, we are all right. Here's a mate of mine nearly seventy years old, who has been a stoker all his life, and can do as good work as I can. Stokers never have the consumption, and rarely catch cold."

"Why do you appear more healthy than the other men here?" asked the reporter.

"Well, I have been on land now about two weeks, and these men just came off the ship. You see, when we finish our watch at the furnaces, we are just covered with sweat, dirt, and oil, and we have to wash the stuff off with warm water. Washing so much with warm water gives us that streaked out look