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THE ADAMS GAS PROCESS.

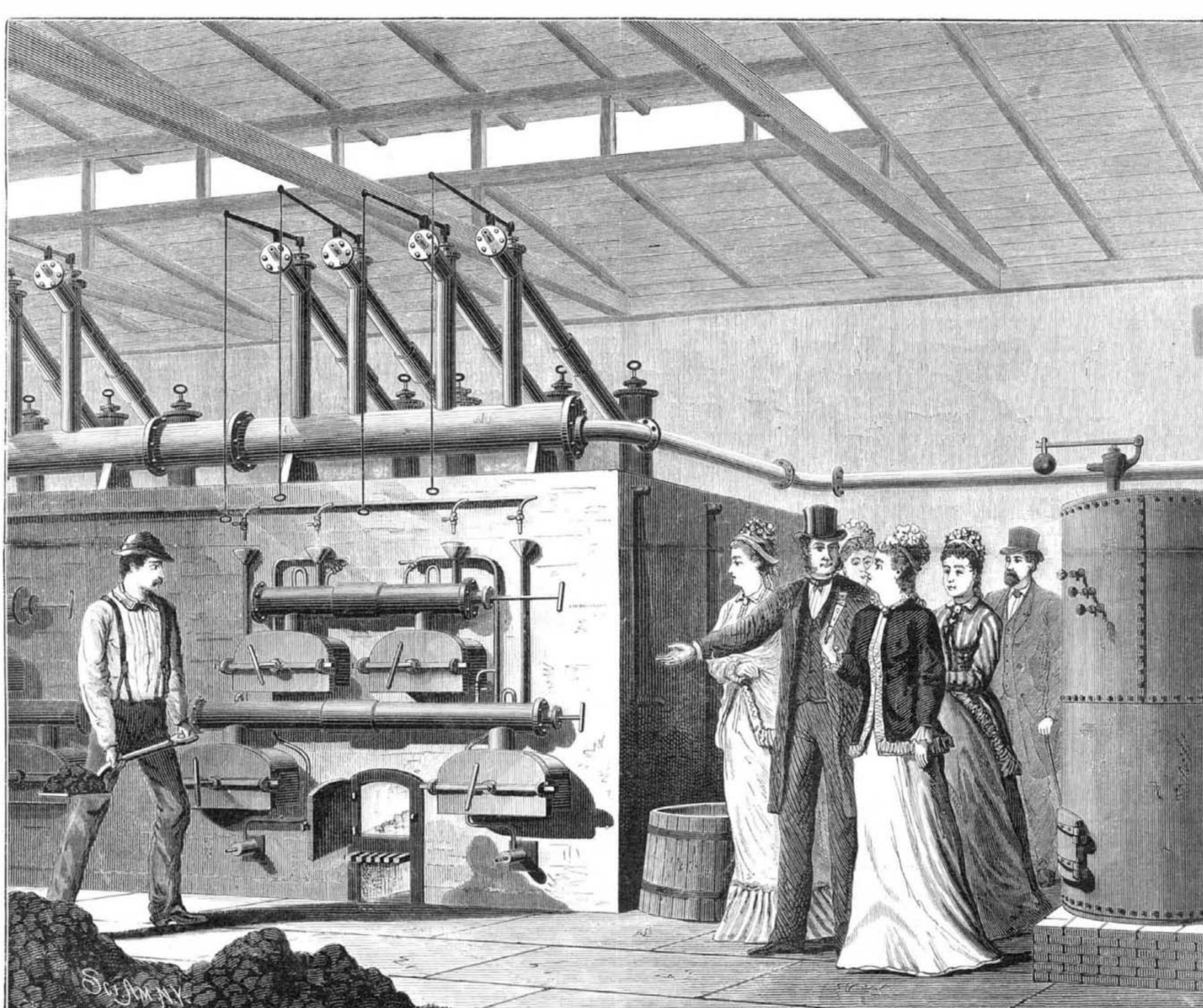
Professor Henry W. Adams, A. M., M. D., of Astoria, N. Y., has recently erected a full bench of retorts, with the necessary apparatus for the manufacture of coal gas by a new process, whereby he claims to have obtained remarkable results in point of economy, rapidity of working, and superiority of product. So far as our inspection has extended, the advantages hereafter detailed seem to be realized; but of this gas engineers and other experts can best judge after consideration of the ingenious system which Professor Adams has devised, and after a visit to the model works which he has erected in Astoria for the purpose of demonstrating the success of his invention. In these works he has a bench containing four full sized clay retorts. These are connected in pairs, each pair being a unit, so to speak, for the purposes of the process, the *rationale* of which is as follows: Retort No. 1 is charged with gas coal in the ordinary way and heated. Two hours afterward retort No. 2 of the pair is also charged, and the products of the fresh charge, tar, aqueous vapor, etc., which are given off before the temperature reaches the point when good illuminating gas is evolved, are led directly into the now highly heated first retort. On the way they are mixed with superheated steam and petroleum vapor. The mingled gases combine with those in retort No. 1 for two hours. Then the charge in that retort is drawn, a fresh charge put in, and the first products of distillation are led into retort No. 2, reversing the former operation. In this way the alternation continues. Professor Adams' trial bench makes, he informs us, 50,000 feet of gas per 24 hours, or over three times the amount which coal alone is capable of producing in the same number of retorts of similar size.

The result of this process is that no tar or ammoniacal water is produced, all the bitumen being converted, or rather decomposed, into gas. Instead of the ordinary average yield of four and a half cubic feet per pound of coal, eight cubic feet of gas, the inventor states, are here produced. As compared with the common process, he furthermore informs us that only one third the number of retorts and one third the labor are needed to make a given quantity of gas in a given time. According to his investigations it also appears that the three gases, namely, from petroleum, from water, and from coal, unite in the retort to form a fixed gas of excellent quality and fine illuminating properties. The general arrangement of Professor Adams' experimental bench is represented in Fig. 1. From the sectional views, Figs. 2 and 3 (page 18), the construction of his apparatus will readily be understood. Referring to Fig. 2, A and B constitute the upper pair and C and D the lower pair of retorts. As the process is the same in each couple, we shall refer, for convenience, chiefly to the upper pair. These in front of the bench are connected by the horizontal pipe, E, in which the mixing of gases is effected. At F are the steam nozzles, which, as shown in Fig. 3, connect by suitable pipes with the superheaters, G, Fig. 3. These are simply clay retorts or pipes placed in the lower flues of the furnace, and into which the saturated steam from a boiler is discharged. It will be seen from Fig. 2 that the products of distillation from retort A, freshly charged, are passing over into retort B, which has been in operation for two hours. The steam jet is seen in operation on the left, and it will also be noticed that the valve, H, which shuts off communication in the pipe, E, between the retorts, is open. In the pipe between the lower retorts it is represented closed. The object of this valve, H, is to shut off connection between the retorts when charging one so as not to lose the gas from the other.

At I, Fig. 3, is the reservoir for oil, which escapes in a fine stream, easily regulated, at the nozzle, J, falling into the retort and upon an inclined apron or gutter, K, Fig. 3. This last is placed in the mouth of each retort, when the latter is charged with coal, for the purpose of causing the liquid to flow back into the hotter portion of the retort, and so conducted to the hottest part of the coal therein.

At L are the four standpipes which are connected to the rear ends of the retorts. The object of this arrangement is to compel the gas tar and aqueous vapors formed in the front ends of the charges to pass through the red hot ends of the retorts and escape from red hot standpipes, being converted into gas during their progress. In order to prevent accumulations of carbon in the mouths of the pipes a tubu-

[*Continued on page* 18.]



GAS WORKS USING THE ADAMS PROCESS.

THE ADAMS GAS PROCESS.

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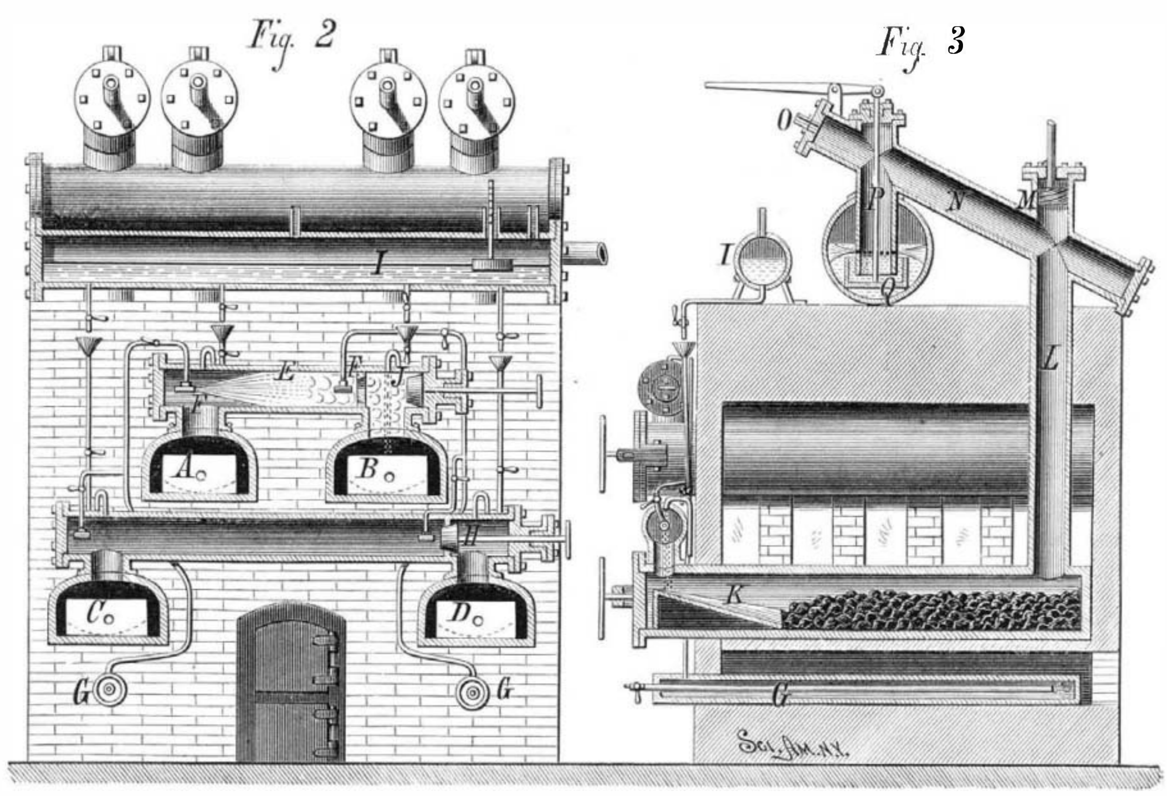
lar cutter shown at M is employed. At N are the saddle pipes, provided with steam pipes, O, for conducting steam through them to cleanse them.

In order to remove the fine particles of carbon which the gas contains, it is caused to bubble through the liquid which seals the dip pipes, P, in the hydraulic main. To this end a ring of holes is made near the end of the dip pipe, and the main is filled with water and gelatin or other gummy substance until the fluid level is above the holes. The gas forces down through this liquid and escapes in jets from the orifices. By means of buckets arranged under the ends of the pipes, as shown at Q, Fig. 3, the holes may be closed. and the gas generated in one retort may be turned into another.

Professor Adams has provided exceedingly ingenious arrangements for washing his gas which we have not space to describe, but which may be seen in operation at the model works above referred to. It will be observed that a large number of new and different devices are here embodied, so that the entire process is novel and interesting apart from its economical advantages.

The invention has been patented through the Scientific American Patent Agency in the United States and all the principal foreign countries. For further information address the inventor as above. He invites all gas companies and gas engineers to visit his works, and see a full demonstration of the rapidity and economy of his system of gas making, by which he unites the gases from coal, petroleum, and water into a fixed gas of dazzling whiteness and brilliancy.



SECTIONAL VIEWS OF ADAMS' GAS RETORTS.

UNSINKABLE STEAM VESSELS.

We take from the London *Graphic* the annexed engraving of a new steel vessel devised by Mr. Edmund Thompson, and claimed to be "unsinkable." This he proposes to accomplish by constructing a cellular frame of thin flanged steel plates, so arranged as to form a series of cells not exceeding 6 feet in dimensions, forming, in fact, a "honeycomb" side, which, when plated over on the inner and outer face, and properly strengthened by longitudinal ties or braces, will afford the greatest strength, with the least possible weight of material, and, in addition, from the inclosed air spaces surrounding the vessel's hull, will give such an enormous lifting power that armor plate of greatly increased thickness may be safely carried, if placed, as proposed by the inventor, within the inner frame, and not, as at present, external to the vessel's side. The advantage of this plan is equally applicable to merchant vessels, as the cargo will be kept free of the sides of the vessel, whereby the tendency to roll or capsize will in both cases be reduced to a minimum. The trunking up of the hatchways, and carrying the transverse bulkheads up to the upper deck, are also proposed, and therefore the effect of an accident either from fire or water would be localized to the compartment affected.

Mr. Thompson's plans of building are applicable either to double or to single ships, or to a modification proposed by him of having a single forward hull, but the after-end tunneled so as to form a double body, between which the screw could be placed about one fourth the ship's length from the stern, completely securing it from injury from shot or wreckage, as well as obviating "slip" and "racing" of the propeller.

Our illustration shows a raft, supported on two pontoons, built on the "cellular" principle, carrying a heavy battery (three feet in thickness where requisite) and an armament, consisting of one 100 ton gun and two 38 ton guns, propelled by two or four screws working between the pontoons, which will only draw six feet of water, the dimensions of the vessel being 400 feet in length by 80 feet in breadth. By reversing either the forward or after screws, the vessel would turn on her own "center," affording that special desideratum, an "all round fire."

The other vessel shown in our illustration is a torpedo boat, with cellular sides, and the screw placed in a tunnel, as before described. This boat would be fitted with noiseless engines, and, by filling the air tubes of the cellular sides with water, could be submerged almost to the water line, to enable her to approach an enemy with slight risk of detection.

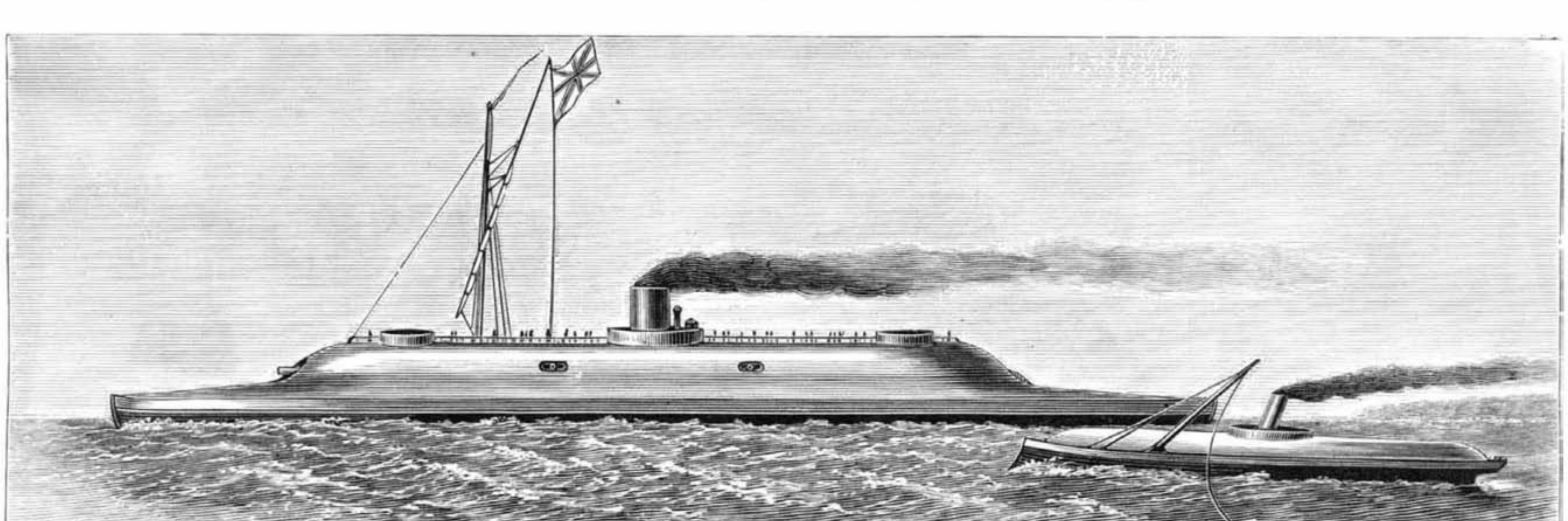
Our Naval Tubs.

The *Army and Navy Journal* says: "Of our Asiatic fleet, a correspondent writes as follows: 'Reports from our ships in Japan and Chinese waters are not encouraging. The Tennessee left for home in March. Under favorable circumstances she can steam eight knots an hour, but her consumption of coal to maintain that speed is as great, if not greater, than the ordinary simple engines would require. The Ranger, one of the additions to the navy under the Eight Sloop Bill, is a failure so far as the compound engines are concerned. She can steam, under favorable circumstances, seven knots per hour, and on her cruise to Formosa, against a very moderate monsoon, she made fifty miles one day and one hundred the next. The Alert, another of the eight sloops, hardly equals the Ranger in speed, although the contract required these vessels to go ten knots an hour. The Monongahela hardly reached the station before her boilers were found to need very extensive repairs. The only efficient ships on the station seem to be the double enders Monocacy and Ashuelot and the tug boat Palos. These vessels have performed more cruising within the last year than all the rest together. It is hoped the Richmond, after being almost rebuilt, will reach the station in a seaworthy condition; but with a botched screw, and boilers in the same condition as the Alaska's, she will probably be a "lame duck" all her cruise.'"

Leaves and their Functions.

A recent lecture at the Royal Institution, by Mr. W. T. Thiselton-Dyer, was devoted to leaves, well illustrated by remarkable plants. Leaves are an outgrowth of soft cellular tissue, originating near the growing point of the stem. The tissue arches over and forms the buds, from which leaves and flowers are developed, with much variety of structure, form, and position, and great diversity of function. The leaf consists of a delicate skin or epidermis (abounding in breathing pores, stomates), and layers of closely packed cells, filled with green chlorophyl granules (green protoplasm), with air spaces between them. The leaves afford a large surface to the influence of light and air. It is supposed that chlorophyl, under the influence of sunlight, separates the carbon from the carbonic acid in the air, gives back the oxygen, and, by combining with oxygen and hydrogen, the component parts of water, forms starch, from which sugar, oils, and fats are derived by chemical changes. The gaseous food of plants is taken in by the leaves; the liquid food, containing nitrogen (an important element in protoplasm) and many mineral substances, is absorbed by the roots. From these albuminoids and alkaloids are derived. Many plants are nourished by decaying animal and vegetable matters; some, such as the Nepenthes or pitcher plant, are provided with suitable digestive organs. When raw meat, for instance, is laid on the digesting surface, a fluid is secreted by which the food is dissolved and absorbed; and an increased number of seeds are produced by plants so nourished. By the hairs on the leaves of Venus' fly-trap the insect is caught, and afterward dissolved and assimilated. The transpiration of the water taken in by the roots is an important function of leaves. By this evaporation it is said that a sunflower gives off, through the stomates, a quart of water in twenty-four hours. The circulation is slow in the cells of the plant, but rapid along the walls of wood cells which have no protoplasm. The erect position of plants is attributed to the turgescence of the cells when filled with water; their drooping condition, to deficiency of the liquid. In conclusion, the lecturer alluded to the phenomena of the irritability of plants, as shown in the sensitive plant, Mimosa pudica; and to what is termed the sleep of plants—shown in two plants, brought under cover from Kew that day. One remained with its leaves closed, the other was awakened by being placed in sunlight. The cause is mysterious, but probably arises from the action of a stimulus creating movements in the molecules in the protoplasm of the cells.

A SCREECH-OWL took possession of a box at Lancaster, Pa., the other day, in which a pair of martins were building their nest, and when they returned would not let them enter. The birds soon flew away and returned with a whole army of companions, each bringing in his beak a piece of mud, with which they hermetically sealed the entrance of the box. When the box was opened a few days later, the owl was found to be dead.



UNSINKABLE STEAM VESSELS.