AN ALUMINUM TORPEDO BOAT.

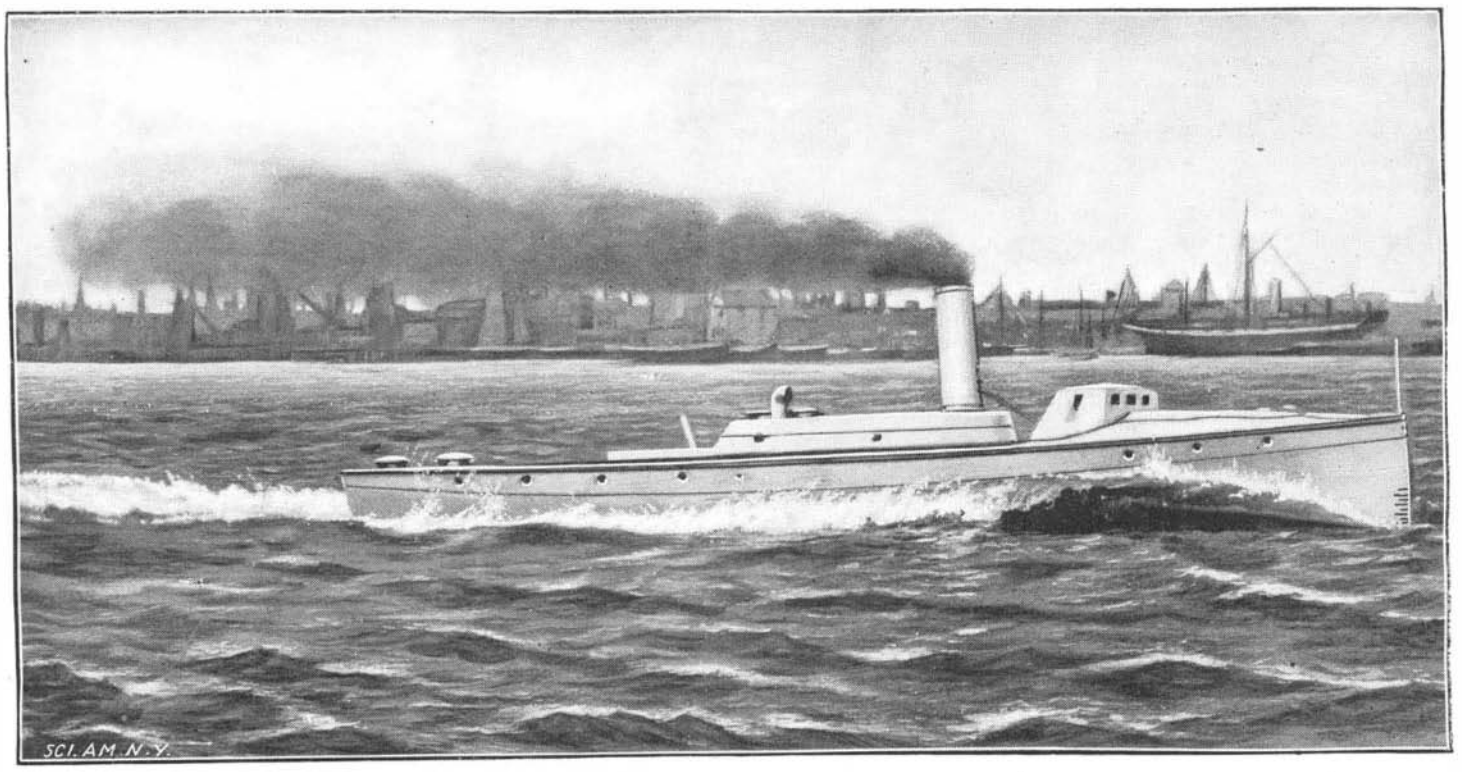
The aluminum torpedo boat which Messrs. Yarrow & Co. have constructed for the French government was recently subjected to trial, so certain engineers, naval officers, and others not officially connected with the vessel might have an opportunity of observing her performance.

The London Times says: The boat is of the second class, being 60 feet long and 9 feet 3 inches wide, a beam 1 foot 9 inches in excess of the older type of second class boat. The chief interest naturally centers in the hull, the machinery consisting of an ordinary set of three stage compound torpedo boat engines and a Yarrow water tube boiler. In design the vessel is on the same general lines as the second class boats recently built by this firm, but the adoption of a lighter material has enabled important alterations to be made in the structure. As compared to a steel boat of the same type, the scantling has been thickened about 25 per cent, in spite of which the total weight of the hull has been reduced about 50 per cent. The builders had the boat weighed when slung on a crane in the docks, the total weight with water in the boiler being 9 tons 8 cwt. Toward this total the hull itself contributed two tons; so it may be taken that an ordinary steel second class torpedo boat's hull weighs four tons. The material of which the hull is constructed is, of course, not pure aluminum, but an alloy consisting of 94 per cent of aluminum and 6 per cent of copper. A large number of experiments have been made by Messrs. Yarrow and by the French government, the results of which point to the proportions adopted being found best for the purpose.

The chief result of using the lighter metal has been that a speed of over 20½ knots was obtained on the official trial, carried out on September 20 under the supervision of a French naval commission, of which Captain Le Clerc, of the French navy, was president. The maximum speed of torpedo boats of this class in the British navy is about 17 knots.

It will be seen that by using aluminum in place of steel in the hull construction—for in other respects the boat is on known lines—an increase of speed of 3½ knots has been obtained, in addition to which there are other subsidiary but by no means unimportant advantages dependent upon the decrease in weight of hull structure. Among these are ease in lifting, additional buoyancy, and freedom from vibration. The latter feature is really remarkable in the new boat, which steams at her highest speed with a degree of vibration, to quote the report of the official trial, "not appreciable;" in fact, when running at her best speed the boat was so steady that one could make notes in the after cabin with facility. Those who are acquainted with the performance of the average torpedo boat when running at speed will appreciate the great advance that has been made in this essential feature, for excessive vibration does much to reduce the efficiency of these high speed craft as engines of war. No doubt the greater steadiness is largely due to the improvements in engine balancing introduced of late, but Messrs. Yarrow & Co. attribute it chiefly to the increased scantling and the non-resilience of the alloy used when it is manufactured in the manner requisite for producing ship plates and angles—for aluminum is among the most resilient of metals when treated in some ways.

Mr. Yarrow states that the price of the material for the hull and fittings varied from 3s. to 5s. per lb., and the metal used in this little boat cost over £1,000.

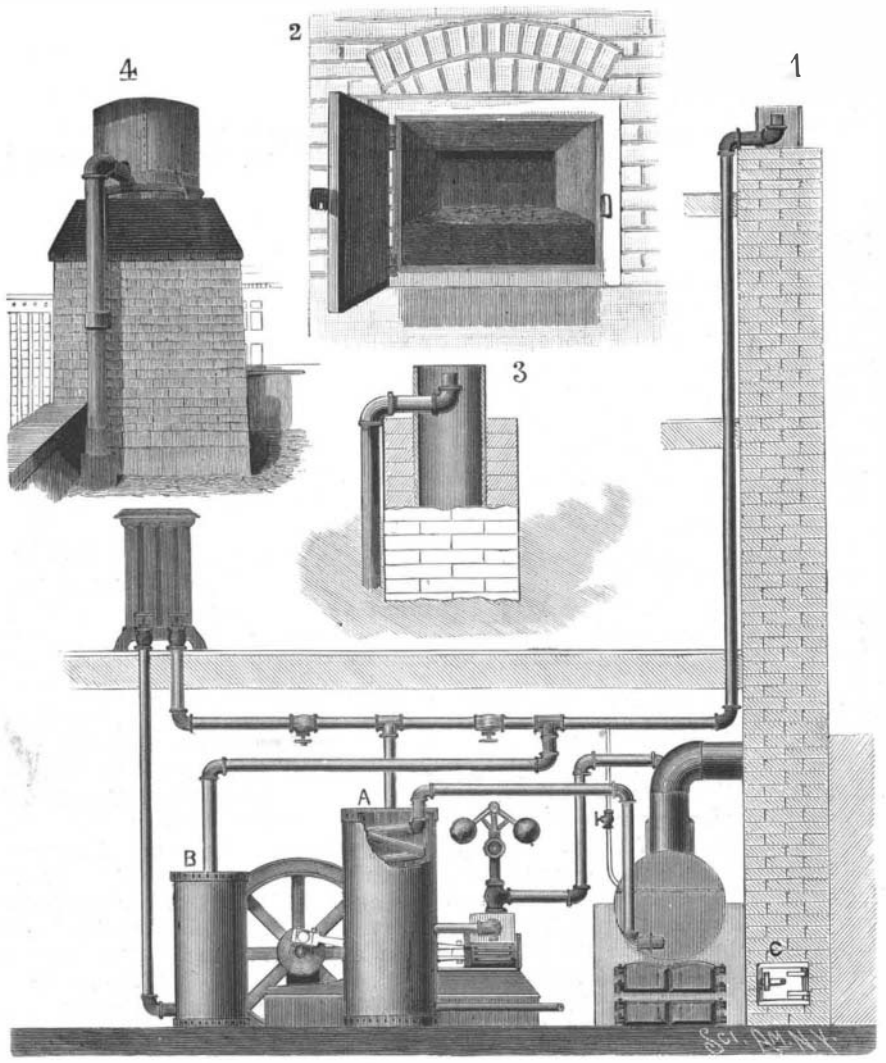


YARROW TORPEDO BOAT MADE OF ALUMINUM.

THE "EUREKA" SMOKE BLEACHER.

The illustration represents a very simple, inexpensive, and automatic device for extracting the coloring matter from smoke, thus enabling steam users to readily comply with the smoke ordinances of cities. It also, by regulating the draught of chimneys, is designed to cause perfect combustion most of the time, thus saving materially in the fuel consumed. The improvement is the invention of Mr. James T. Sands, 510 Pine Street, St. Louis, Mo., and consists in extending the exhaust steam pipe either outside or inside the chimney to within about four feet from the top. Live steam is also connected to the exhaust, to be used in case of emergency. A vacuum is produced by the velocity of the steam entering the air, and a slight down draught is also caused, carrying the carbon saturated with moisture of the steam to a soot box at the bottom of the chimney. The gases in the chimney receive an extra impetus in filling the vacuum, thus drawing an additional amount of oxygen into the furnace, and the draught in the chimney is uniform, because governed by the velocity of the steam at 212 degrees Fah., the point of condensation. Ninety-six per cent of the carbon entering the chimney is said to be precipitated, and can be sold for lampblack for making inks, etc. The other four per cent is either precipitated on the roof or chemically changed, as no color is visible from four to ten feet from the chimney.

In the illustration Fig. 1 shows the bleacher connected with the steam exhaust, A being the water heater connected with the engine exhaust, B a vapor tank, and C a carbon or soot box at the bottom of the chimney; Fig. 2 shows the carbon box open and the way the carbon is deposited, as represented by a photograph, the size of the box being 18 inches by 24 inches by 24 inches; while Fig. 4 is an exterior view of the chimney top and Fig. 3 is a sectional representation, showing one form of the exhaust steam discharge near the top of the chimney. The distance from the top of the chimney at which the discharge is made, as also the form of the discharge pipe and its nozzle, may be considerably varied, according to the height and draught of the chimney.



SANDS' APPARATUS FOR BLEACHING SMOKE.

This device has been in successful operation for the past eight months on the chimney of the Roe building, a large office structure in the city of St. Louis, Mo., and by actual test ninety-six per cent of the carbon entering the chimney was found to be precipitated, analyzing: 2·06 per cent moisture; 34·26 per cent volatile matter, mostly carbon, with some salts of ammonia; 63·68 per cent ash, metallic, mostly ferrous oxide; total, 100; which shows much less volatile matter than either London or Glasgow soot. A close observation, covering the past eight months, presents some peculiar phenomena. Most of the time nothing is visible coming from the chimney, and although it is three and a half feet in diameter and has a six inch steam pipe within four feet of the top pouring in its vapor, still the chimney looks as though no work was going on, while buildings close by are puffing steam twenty-five feet in the air from exhaust pipes. In this condition a paper placed in the soot box will show only a few drops of clear liquid per minute, shovel in a bushel of coal into the furnace, and in another moment the paper will be covered with small black pellets of carbon, quite moist. During the dry, hot months the carbon was deposited in the center of the soot box at the bottom and had to be hoed out; but in cooler, and particularly damp, weather it was quite moist, extending to the door of the soot box and formed in layers each day. The average

amount collected is one hundred and fifty pounds per month for this small plant—three hydraulic elevators, a small dynamo, and heating building, mostly by elevator exhaust steam. The experience with this bleacher has seemed to develop the fact that there are conditions of the atmosphere which defy precipitation. At times when all the chimneys with smoke-abating devices are pouring a volume of thick, black smoke into the air, this bleacher precipitates a less amount of carbon, and the smoke is a light gray or straw color. Ordinarily, smoke and steam (as noticed when the exhaust pipe is attached to the chimney) have an affinity and easily commingle; but on these particular days the steam and smoke go into the air side by side, but never blend; these are the days when people say it is close, hot, sticky, damp, and generally uncomfortable.

The effect of the uniform and increased draught was found to be very marked, for no matter what the condition of the atmosphere, the furnace fire was always bright and of a whitish color, when formerly it was never hotter than red, and varied in briskness with the conditions of the atmosphere. The combustion has been absolutely perfect most of the time, and it has seemed to matter little what quality of coal is used, for during the recent strike resort was had to anything in the shape of coal—full of slate, sulphur, iron, etc., even slack and coal with only thirty per cent fixed carbon—all seemed to burn the same. The extra amount of oxygen drawn into the furnace by the vacuum so near the top of the chimney seemed to hunt out the particles of carbon and when found consume them.

The device, it is claimed, can be used on ocean and river vessels, and on locomotives when the grades are slight, the locomotives being equipped so the old method can be used for heavy grades and the new for level running, thus saving in fuel and doing away with sparks and much of the noise. Patents have been taken out for the improvement in Canada, the United States, England, France, Germany, and other European countries.

British Emigration.

The October circulars of the Emigrants' Information Office, Westminster, London, England, show the present prospects of emigration. This quarterly information is supplemented by a monthly report in the Labor Gazette. It should be noted that the steerage fares to Canada and Australasia are exceptionally low at the present time, that free passages for female domestic servants to Western Australia and to Natal have been stopped, and that assisted passages for such servants to Cape Colony have been resumed. The warning against the emigration of clerks to the colonies still holds good. It is too late for emigrants to go to Canada this year, unless they have friends or situations to go to, or have money enough to keep them through the winter. During this last summer the demand for ordinary farm hands has been less than in previous years, though really experienced men had little difficulty in obtaining work. There is no demand for mechanics. In New South Wales the coal mining industry has improved at Newcastle, and the number of unemployed at Sydney has been on the decrease, but there is no opening at present for more labor, either in town or country. During the first six months of this year nearly 6,000 of the unemployed were sent by the Government Labor Bureau from Sydney, Newcastle, Lithgow, Goulbourn, and other centers, to search for gold, and over 2,000 were assisted to work in other occupations. In Victoria there has been a fair demand for blacksmiths and farriers at Melbourne at reduced wages, but otherwise the metal, building, and other trades are all amply supplied with labor. The yields of the Victorian gold fields continue to increase satisfactorily. In South Australia there is an ample supply of all kinds of labor. There is no demand at present, either at Brisbane or in country districts, for any more hands. In Western Australia the new gold fields in the southwest continue very busy; and large numbers of miners have arrived from other parts of Australia. Tasmania offers no openings at the present time to the ordinary emigrant without means of his own. Reports from all parts of New Zealand state that, with some few exceptions, all branches of work are slack everywhere, and that unskilled labor is especially plentiful. In Cape Colony there is no prospect of any kind of artisan finding employment on the government railways or elsewhere. In Natal most branches of labor are well supplied, and many enginemen, firemen, etc., on the government railways have been put on short time. In Mashonaland and Matabeleland there is no opening for emigrants without capital. The British consul at San Francisco, in his recent annual report, especially warns Englishmen against paying premiums to agencies in this country for instruction in farming in California. Lord Derby recently opened the session of the Manchester Geographical Society with an address on Canada. After describing the migration of young farmers from Eastern Canada to Manitoba, he said that a settler would feel in Ontario that he was not altogether in a new country, and the farms very much resembled our own. As to Manitoba, he was not sure whether it had not been a little overdone.

An Easy Method of Keeping Warm.

I should like to call attention to an easy method of warming one's self when other and more common means are not available. It is a method that I suppose is well enough known to the profession, but probably not often used. I allude to warming the body by merely taking deep inspirations.

On one very cold afternoon of last winter, though walking briskly along, I was uncomfortably cold; feet and hands were very cold, and my ears so chilled as frequently to require the application of my heavily gloved hands. In addition, the whole surface of the skin was unpleasantly chilled; "creeps" ever and anon running up and down my spinal column and radiating thence over the body and extremities; in short, a condition that every reader of this little article has doubtless many a time experienced. I then began taking an exercise often employed before with benefit: deep forced inspirations, holding the air as long as possible before expulsion.

After a few inhalations the surface of my body grew warmer, and a general sense of comfort pervaded me. Continuing, the next to feel the effects of the effort were my previously frigid ears. They grew agreeably warm, and within the time required to walk three blocks, at the previous pace, hands and feet partook of the general warmth, and I felt as comfortable as if the same length of time had been passed by a glowing fire.

The happy results obtained from this simple method are probably owing to several causes:

The cold, of course, chills the surface of the body and contracts the superficial blood vessels, usually affecting first hands, feet and ears, and afterward the general body surface. Contraction of the blood vessels results both in less blood to the part and in stagnation of the current, thus rendering the tissues still less able to resist the cold. Deep forced inspirations not only stimulate the blood current by direct muscular exertion, but also by compressing and expanding the lungs the flow of blood is greatly hastened through this organ, and on account of the increased amount of oxygen inhaled, this abundant supply of blood is thoroughly oxygenated, tissue metabolism is increased and more heat necessarily produced.

Many times unavoidable exposure, as in riding, driving, standing and the like, for a longer or shorter time in the cold, has been the cause of severe and even fatal congestive troubles, such as pleurisies and pneumonias, and a means of quickly stimulating the flagging peripheral circulation which a person has always with him, and which can be employed without moving a step, is one that ought not to be neglected or forgotten.—E. B. Sangree, M.D, American Therapist.

The Star of Bethlehem.

Some time ago various newspapers of Europe and America contained the startling intelligence that the star which guided the "Wise Men" would again appear. This star was connected with that celebrated one which 318 years ago suddenly disappeared from the constellation Cassiopeia, and it was found that this star of 1572 had previously appeared in the years 1264 and 945, and—if counted back—must have appeared in the year of the birth of Christ. If these facts were well established, we must certainly expect the star to appear again in our days. We should then see a new body in the heavens, entirely unlike any fixed star, to be seen in full daylight, which would, in a short time, again disappear.

Every astronomer in recent times has asked hundreds of questions on this subject. Is it true that the Star of Bethlehem will again appear? Is it periodical? Is its place in the sky appointed? The next question is, What really happened in 1572?

It was a few months after St. Bartholomew's Night. Tycho Brahe, the great observer of those days, tells us that: "One evening as I was watching the heavens in my accustomed manner, I saw, to my great astonishment, in the constellation of Cassiopeia, a brilliant star of unusual clearness." This was on November 11, 1572. Three days before the star had been seen by Cornelius Gemma, who spoke of it as "this new Venus." In December of the same year, its luster began to wane; and in March, 1574, it had entirely disappeared, leaving no trace. As to the stars of 945 and 1264, we have no authority except that of the Bohemian astrologer, Cyprian Lowitz. No historian mentions them, and the Chinese chroniclers, who watched all appearances in the sky, with great care, do not speak of them. Even granting the appearance of these stars to have been a fact, their resemblance to the Star of Bethlehem is doubtful. It is true, that by counting back we come to the years 630, 315 and 0; but the star should have again appeared some time between 1880 and 1891.

With regard to the Star of Bethlehem there are five assumptions. 1. It had no existence, and the entire statement is a beautiful oriental fairy tale. 2. The fixed star, seen by the Wise Men, was Venus, at the time of its greatest splendor. 3. It was a periodical star like that of 1572. 4. The phenomenon was occasioned by a conjunction of planets. 5. It was a comet. Of these assumptions, the most probable is the second. That it was a periodical star is scarcely likely, for Ptolemy and Ma-tuan-lin would have spoken of it. The fourth statement was suggested in 1826 by the German astronomer Ideler, and repeated by Encke in 1831. In the year 3 B. C. there were conjunctions of the planets Jupiter, Mars and Saturn on May 29, September 3, and December 5, but on none of these days were the planets nearer together than a degree, so that the Wise Men must have been very near sighted to take them for one star. The fifth assumption is also not to be considered, for people already knew how to distinguish a comet from other stars, and besides, we have no knowledge of a comet at that time.

For all these reasons we have not the least occasion to expect the return of the Star of Bethlehem at the close of our century. And even if such a star should appear it would simply be the twenty-sixth such case observed in historical times, and the interest attached to it would be purely astronomical.—Public Opinion, from Camille Flammarion, in the Stuttgart Deutsche Revue.

The Interior Friction of Oils.

Petroff, who has occupied himself very extensively with the examination of lubricants, has investigated the interior friction of oils by means of an apparatus invented by himself, and has given his results in tabular form and graphically by a series of curves. According to his results, the degree of transparency of lubricants, the refining process, viscosity, flash point and fire point give no basis for estimating the degree of interior friction, though all are of importance. If two oils which at the same temperature possess different interior frictions be mixed, the mixed product will yield a characteristic curve corresponding to that of an oil the qualities of which lie between those of the two components. Consequently, the excessive friction of any thick lubricant may be reduced by mixing with it small proportions of solar oil, pyro-naphtha or kerosene, or any oil possessing low interior friction. But this addition can be useful only when the added product does not separate to any great extent. The addition of such light oils can, of course, be easily detected through the flash point and the fire point. The addition of various resinous materials increases friction in the machinery and in the lubricant itself; while these products have also an injurious chemical effect upon the metallic surfaces subjected to friction. It was also frequently observed that samples of the same oil that were received in the factory at different times did not yield the same characteristic curve, though filling all requirements. This fact is naturally important to consumers on economic grounds.

The New German Trade Mark Law.

In pursuance of the general plan of reconstruction and improvement which has been in operation during the past two years in the German Patent Office, and which has done away with some of the antiquated practices which, until recently, have prevailed in the administration of that department of the government, a new law has been enacted, establishing a new system in regard to the registration of trade marks. This new law went into operation on October 1. It declares that all marks registered under the old law are invalid and it gives a definite term within which old marks may be re-registered in compliance with the new requirements. The mark is granted for a term of ten years, which term may be prolonged.

In filing an application for registry of a trademark in Germany, it is necessary for a non-resident to prove that he has received similar protection in the country of origin, and to that end a certified copy of the trade mark as registered in the country where applicant is domiciled must be furnished and the same must be legalized by the German consul. The general requirements are quite similar to those at present in force in the United States practice. In case any one files a mark which had been registered under previous acts, it is well to furnish a certified copy of the original registration. It is rather curious that the necessity for new registration of German trade marks has been effected by direct legislation, while in United States the same necessity arose through the celebrated decision of the Supreme Court in the case of United States vs. Steffens et al., which rendered all trade marks registered under the act of 1870 void, owing to the unconstitutionality of this law.

PAPER from sunflower stalks has recently been produced in the south of England, but as the fiber in the stems is too short to produce a material of fine texture suitable for writing or printing upon, the experiment is not likely to be continued. Some 500 lb. of sunflower stalk produced, by the aid of proper paper-making machinery, about 320 lb. of paper. This was not suitable for other purposes than packing, and to make a good paper it was estimated that the addition of 50 per cent of rags or similar material would be necessary.